

Photo- multiplier Tubes

Photodiodes
Electron Multipliers



RCA

This catalog provides information on RCA's current line of **photomultipliers**, **electron multipliers**, and **gas and vacuum photodiodes**. The types described indicate RCA's broad capabilities; they do **not** comprise the **entire** line.

Variants of the listed types are available having —

1. different window and photocathode materials,
2. different spectral responses — with peaks at selected or specified wavelengths,
3. different configurations, and
4. other special characteristics, e.g., non-magnetic construction, more rugged design.

You are invited to review your photodetector requirements with your nearest RCA Distributor or Sales Representative. See page 82.

Additional data and information on photomultipliers and on some of the electron multipliers are available in technical bulletins for each individual type or family. It is to be noted that data, especially for developmental types, are subject to change. Product bulletins as well as current information on the different photodetectors, may be obtained from your Sales Representative or may be requested from Commercial Engineering, RCA Corporation, Harrison, N.J. 07029. Please specify the types in which you are interested.

Sufficient information is given in this catalog on gas and vacuum photodiodes for equipment design purposes. Individual data sheets are generally not available for these devices.

State-of-the-Art Advances

Revolutionary developments in photodetector design and manufacture over the past several years have resulted in unprecedented performance improvements for these products. RCA is the leader in these developments. From high efficiency secondary emitters such as gallium phosphide to photocathodes such as ERMA, ERBA, gallium arsenide, gallium arsenide phosphide, and most recently — gallium indium arsenide, the trend is clearly established: the marriage of solid-state and vacuum-tube technology, to provide the best of both, in QUANTACON photomultipliers.

Earlier claims of performance for phototubes made with III/V secondary emitters and/or photocathodes have been borne out in commercial and developmental RCA products. Some of these are:

I. GaP Secondary Emitters

A. First dynode only (e.g., 8850, 8851, 8852, 8853, and 8854)

- Higher secondary-emission ratio
- Better electron resolution
- Lower noise in signal current

The performance of the tubes listed above has been established to be even better than anticipated — and at a reasonable price.

B. All dynodes (e.g., the C31024 family)

- Subnanosecond rise time, less than 800 picosecond for single electrons
- Convenient, simplified, small-size configuration, four to six stages provide performance and gain capability comparable to phototubes having twice as many stages
- High electron resolution capability

II. III/V Photocathodes

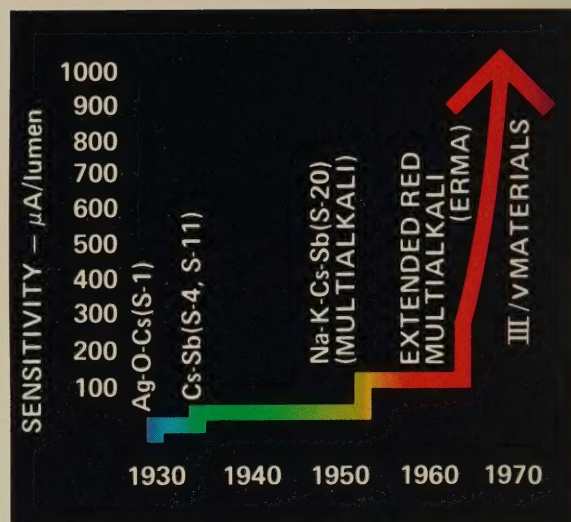
As exemplified by the graph above, extraordinary strides have been made in cathode sensitivity since the introduction of the first III/V photocathodes. A premium version of one of these tubes, the **C31034A** — an 11-stage, head-on photomultiplier having a gallium-arsenide photocathode — **has the highest photocathode sensitivity over the UV to the near-IR range of any known commercially available photoemissive device in the world:** luminous photocathode sensitivities of over 1000 $\mu\text{A}/\text{lm}$ have been obtained!!!

Recent RCA effort has been directed toward GaInAs photocathodes which will provide response further into the near IR range, up to 1100 nm, with Q.E. levels four to five times better than S-1 photocathodes, and with at least an order of magnitude improvement in dark current.

These newly-evolving photocathodes show promise of even better performance.

III. Integrated Photodetection Assemblies —I.P.A.

RCA now introduces compact I.P.A.s which include a photomultiplier; solid-state power supply, voltage multiplier, and signal-conditioning amplifier (optional); optical filter (optional); magnetic shield; and all necessary connectors and cables. With these assemblies, the designer need only specify his light input and desired signal output to be assured of the performance he needs. Performance, compactness, and economy — RCA leads in photomultiplier state-of-the-art.



The cover symbol, as delineated above, portrays the extraordinary increases in photocathode sensitivities effected by RCA in the last few years due to new materials and new processing techniques.

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Type numbers with prefix letter "C" identify developmental types suitable for engineering evaluation. The number and identifying data are subject to change. Before specifying any of these types in production equipment, please contact RCA. No obligation is assumed by RCA as to future manufacture of developmental types unless otherwise arranged.

Information furnished by RCA is believed to be accurate and reliable. However, no responsibility is assumed by RCA for its use; nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of RCA.

Glossary of Terms

Å — angstrom: 10 angstroms (Å) = 1 nanometer (nm) = 1×10^{-9} meter (m)

Anode — An electrode through which a principal stream of electrons leaves the interelectrode space.

Anode Dark Current — The current, in a photomultiplier tube, measured in complete darkness. It is defined as that component of the output current remaining when ionizing radiation and optical photons are absent. Dark current and resulting noise are critical factors in limiting the lower level of light detection.

Anode-Pulse Rise Time — The time difference between the 10 and 90 per cent amplitude points on the output waveform for full-cathode illumination and delta-function excitation. Anode-pulse rise time is measured with a repetitive delta-function light source and a sampling oscilloscope. The trigger signal for the oscilloscope may be derived from the device output pulse, so that light sources such as a scintillator light source may be employed.

Be-O (Cu-Be) — Beryllium oxide secondary emitting surface, copper-beryllium substrate.

Bialkali Photocathode (K-Cs-Sb) — A photocathode having a spectral response similar to S-11, but having the advantage of lower dark noise at room temperature, higher peak quantum efficiency and the ability to withstand somewhat higher temperature than other photocathodes.

Bialkali Photocathode (Na-K-Sb) — A photocathode having a spectral response similar to that of the K-Cs-Sb Bialkali photocathode but with the ability to withstand extremely high operating temperatures (up to 150° C).

Circular Cage (C) — A focused multiplier configuration in a circular arrangement; it permits a compact layout and good time response.

Cs-Sb — Cesium antimony

Cs-Te — Cesium telluride

Current Amplification (Gain) — The ratio of 1) the signal output current to 2) the photoelectric signal current from the photocathode.

Dark Current — See Anode dark current.

Dark Pulses — Pulses observed at the output electrode when the photomultiplier is operated in total darkness. These pulses are due primarily to electrons originating at the photocathode.

Delta Function Light Source — A light source whose rise time, fall time, and FWHM are no more than one-third of the corresponding parameters of the photomultiplier's output pulse.

Dynode — A secondary-electron emitting electrode.

Equivalent Anode Dark Current Input (EADCI) — The quotient of the anode dark current by a stated anode luminous sensitivity value.

Equivalent Noise Input (ENI) — That value of incident flux which when modulated in a stated manner produces an rms output current equal to the rms noise current with a specified bandwidth.

ERBA — An acronym for Extended Red BiAlkali photocathode

ERMA — An acronym for Extended Red MultiAlkali photocathode.

Full Width at Half Maximum (FWHM) — The full width of a distribution measured at half the maximum ordinate. For a normal distribution it is equal to $2(2 \ln 2)^{1/2}$ times the standard deviation (σ).

Ga-As — Gallium arsenide

Ga-As-P — Gallium arsenide phosphide

Gain — See Current Amplification

Ga-In-As — Gallium indium arsenide

Hysteresis, Photomultiplier Tube — A temporary anode-current instability exhibited when light levels are first applied, especially after a change in voltage. The time required to reach a stable anode current may vary from a few seconds to a minute or more. This effect is not observed in all PMT's.

In-Line Cage (I) — A focused, or non-focused, multiplier configuration in a linear structure; it permits more dynodes than the circular cage configuration. Note: a venetian-blind cage is non-focused.

IR — Infrared

Multialkali Photocathode (Na-K-Cs-Sb) — A photocathode sensitive from the ultraviolet to the red and near infrared regions of the spectrum. Compared with the cesium-antimony photocathode, it has improved response in the red region.

Noise — The random output which limits the minimum observable signal from the phototube.

Non-Magnetic Photomultiplier Tube — A photomultiplier using a structure having a minimum of ferro-magnetic materials. The ferro-magnetic materials that are present are usually limited to short lengths of Kovar or Dumet wire located in the glass stem of the tube.

No. of Stages — Equivalent to the number of dynodes used.

Opaque Photocathode (Reflection-Mode Photocathode) — A photocathode wherein photoelectrons are emitted from the same surface as that on which the photons are incident.

Optical Photons — Photons with energies corresponding to wavelengths between 120 to 1800 nanometers.

Photocathode — An electrode used for obtaining photoelectric emission.

Photocathode Blue Response — The photoemission current produced by a specified luminous flux from a tungsten-filament lamp operated at a color temperature of 2854° K when the flux is filtered by a C.S. No.5-58 blue filter of half-stock thickness. This parameter is useful in characterizing response to scintillation counting sources.

PHR — See pulse height resolution

PMT — An abbreviation for photomultiplier tube.

Pulse Height Resolution (PHR) — The fractional full width at half maximum of the pulse height distribution curve (FWHM/A1), where A1 is the pulse height corresponding to the maximum of the distribution curve. In scintillation spectroscopy, it is customary to state PHR as a percentage.

QUANTACON — The RCA designation for photomultiplier tubes employing group III/V compounds as secondary emitters and/or photocathodes. A typical III/V secondary emitting compound is Ga-P; a typical III/V photocathode compound is Ga-As.

Quantum Efficiency — The average number of photoelectrons emitted from the photocathode per incident photon. Quantum efficiency in per cent at any given wavelength can be calculated from the following formula:

$$QE = \frac{\sigma (1239.5) (100)}{\lambda} \quad \%$$

where, λ is the wavelength in nm and
 σ is the cathode radiant sensitivity in A/W at λ

Red-to-White Ratio — The quotient of the anode current (measured using a specified red filter interposed between a tungsten-filament lamp and the tube) by the anode current measured with the filter removed.

S/N — Signal-to-noise ratio

S & V — Shock and vibration

Scintillation — The optical photons emitted as a result of the incidence of a particle or photon of ionizing radiation on a scintillator.

Scintillation Counter — The combination of a scintillator, phototube, and associated circuitry for detection and measurement of ionizing radiation.

Sensitivity, Anode Luminous — Same as sensitivity, cathode luminous but referred to anode.

Sensitivity, Anode Radiant — Same as sensitivity, cathode radiant but referred to anode.

Sensitivity, Cathode Luminous — The quotient of photoelectric emission current from the photocathode by the incident luminous flux under specified conditions of illumination. Because cathode luminous sensitivity is not an absolute characteristic but depends on the spectral distribution of the incident flux, the term is commonly used to designate the sensitivity to radiation from a tungsten-filament lamp operated at a color temperature of 2854° K. Cathode luminous sensitivity is usually measured with a beam at near normal incidence.

Sensitivity, Cathode Radiant — The quotient of the photoelectric emission current from the photocathode by the incident radiant flux at a given wavelength under specified conditions of irradiation. Cathode radiant sensitivity is usually measured with a beam at near normal incidence.

Single Electron Rise Time (SERT) — The anode-pulse rise time associated with single electrons originating at the photocathode. Measurement of SERT requires a photomultiplier having an adequate gain so that the single electron event may be viewed on a sampling oscilloscope.

Time Jitter — See transit time spread.

Time Resolution — See transit time spread.

Transit Time Spread — The FWHM of the time distribution of a set of pulses each of which corresponds to the photomultiplier transit time for that individual event.

Transmission-Mode Photocathode — A photocathode in which radiant flux incident on one side produces photoelectric emission from the opposite side.

UV — Ultraviolet

Venetian Blind Cage (V) — A non-focused linear multiplier structure. It has slower time response than focused multiplier structures and is characterized by large dynode areas.

Typical Photodetector Applications

The many and varied requirements of equipment designers and experimenters preclude RCA from suggesting a single photodetector as the optimum tube for any given application. In most applications, trade-offs must be made in electrical characteristics; tube size must be considered; the environment in which the device is to be operated is a factor; and, of course, tube cost is important. Each of these limitations is known only to the individual designer or experimenter. Accordingly, the tube types indicated for the different applications should be considered as representative of those which are used in that area.

General Application Description	General Function	Typical Application Areas	Frequently Used Photodetectors	
Densitometry	The measurement of optical density of photographic negatives, neutral density filters, and similar materials.	Film processing, film manufacture, chemical industry, atomic energy laboratories, and university laboratories.	1P21 931A 934 4471 4472	4473 4552 8571 C7075J
Colorimetry	The quantitative color comparison of surfaces (reflectance) and solutions (transmission).	Industrial, clinical, and scientific establishments concerned with paints and finishes, blood and tissue analysis, and chemical reactions producing color changes.	1P21 1P22 1P39 931A 934 4471	4472 4473 4552 8571 C31025B C34001
Photometry	The measurement of illumination and/or brightness (luminance).	Photography and astronomy	1P21 931A 4471 4472 4473	7102 8571 C7164R C31025B
Radiometry	The measurement of irradiance and/or radiance.	Space programs and astronomy	1P21 1P28 1P28A 1P28/V1 1P28A/V1 PF1011	7102 8571 8645 C31022 C31025C C31034, A
Spectrophotometry (Specific types of spectrophotometers are listed below)	The measurement of radiant power in narrow wavelength regions of the radiation spectrum. Photomultipliers are useful in the 120 to 1200 nanometer range.	Extremely widespread usage in many scientific and industrial laboratories. Used in process control, element identification, and in all kinds of chemical and metallurgical analysis.		
Emission Spectrophotometers	The measurement of wavelength and intensity of characteristic spectral emission lines of elements when an electric spark, arc, or glow discharge is used for excitation.	Useful in qualitative and quantitative chemical analysis. An example is rapid "on-line" analysis of alloying elements and impurities in steel production.		
Absorption Spectrophotometers	The measurement of distinct transmission and absorption bands in transparent solutions and gases, or translucent suspensions, emulsions, or slices of tissue. Also used in reflection mode for opaque materials.	Widely used in biological research, food industry and organic chemical production.	1P21 1P28 1P28A 1P28/V1 1P28A/V1 931A	7102 8571 C7151U, W, Y, and Z C31022 C31025B, C, and J C31034, A C70128
Atomic-Absorption Spectrophotometers	By vaporizing the sample in flame, the elements in the sample are ionized and absorb energy in narrow spectral lines, rather than in spectral bands. This type of instrument is sometimes called a Flame Spectrophotometer.	Useful for qualitative and quantitative chemical analysis. Generally more sensitive than emission spectrophotometry but requires use of light sources (discharge lamps) having spectral output at the absorption wavelengths.		
Fluorescence Spectrophotometers	By producing fluorescence in the sample (usually by UV excitation), detection of certain contaminants or impurities at extremely low concentrations is practical.	Useful in synthetic polymer research. For example, fluorescence analysis is used for detecting, identifying and measuring an additive, plasticizer, or impurity in polymer films.		
Raman Spectrophotometers	Provides information on molecular structure and bonding energy by measuring the amount of wavelength shift of scattered photons from a highly monochromatic source such as a laser.	Scientific and industrial laboratories	7326 8850 8852 8853 C7151W	C7164R C31025B, C C31034, A C70042K, R PF1011 PF1012
Photon Counting	A method of detecting photons by counting single photoelectrons released from the photocathode.	Astronomy and scientific laboratories	8575 8850 8854	8852 8853 C31034, A
High Speed Inspection	Small objects such as fruits, vegetables, seeds, candy, toys, paper products and even glass, metal, and other industrial parts can be examined for color and defects as they move past one or more photomultiplier tubes at high speed. An airblast can be used, for example, to separate the defective items from the acceptable ones.	Food processing plants, agricultural experiment stations, and manufacturing plants	1P21 931A 4517	6199 6342A 7102 7767
Process Control	The measurement of transmitted or reflected light in continuous flow processes using solids, liquids, or gases. Detects flaws, improper marking, and changes in color and optical density. By using scintillators and radioactive sources, photomultipliers can be used for weight and thickness control of opaque materials.	Steel mills, paper mills, chemical plants, oil refineries, and glass factories	931A 4517 4518 4523 4524 4525 6199 6342A 8053	8054 8055 8575 8850 C7151AA C31000AJ C31016G C70042S

General Application Description	General Function	Typical Application Areas	Frequently Used Photodetectors	
Imaging Devices	A cathode-ray tube or moving mirrors can be used as a light source to sequentially illuminate a film positive or negative, or a printed page. This system is used in (1) optical character recognition, (2) scanning of printed or written material for transmission by telephone (3) parts inspection, and (4) reproduction of motion pictures, slides, and educational material on a TV receiver (color or black and white). This latter application is referred to as a Video Playback System.	Office equipment, accounting equipment, military equipment, home entertainment, education, and manufacturing plants.	931A 2020 4463 4555 6199 6342A 8053	8054 8055 C7151W C7164R, S C31028
Laser Detection	Lasers provide unique light sources; they are spectrally pure and produce very narrow collimated beams. They can be very intense, and can be made to produce light pulses of extremely short time duration. The PMT provides time resolution in the nanosecond and subnanosecond ranges and is capable of detecting very low light levels such as those received from weak reflected laser light pulses.	Construction companies, machine tool manufacturers, military (range finders), space exploration, communications, chemical industry, and universities.	4526 7102 7265 8644 8645 8575 8850 8852 8853 C7151W	C7164R C31004A C31025K, M, and N C31034, A, B, C, and D C70007A C70042K C70102B
Scintillation Counting	Under Normal Environmental Conditions The measurement of nuclear radiation by detecting light emitted from a scintillating material receiving nuclear radiation. Used for radiological survey instruments and the identification of radio-isotopes.	Atomic energy laboratories, atomic power plants, hospitals, clinics, research laboratories, and universities.	4516 4517 4518 4522 4523 4524 4525 6199	6342A 8053 8054 8055 8575 8850 8854 4802
	Under Severe Environmental Conditions The measurement of nuclear radiation by detecting light emitted from a scintillating material receiving nuclear radiation. Used for radiological survey instruments and the identification of radio-isotopes.	High-Temperature Applications Deep oil-well logging or geological exploration, and steel mills.	C7151AA C31000AJ C31016G C70042S	
		Mechanical Applications Space programs, extraterrestrial radiation detection.	4460 4461 8664 8575 C7151N, Q C31009, A, B, and C	C31012, A, B, and C C31016F C70102E, M C70114F C70132B
Time Measurement	In nuclear experiments the "time of flight" of nuclear particles is important. Photomultipliers permit time measurement down to a fraction of a nanosecond.	Atomic-energy laboratories and universities.	8575 8850 C31024 C70045C, D	
Pollution Monitoring	The analysis of the level and the nature of contaminants in solutions, gases, and other waste materials.	General industrial plants, waste treatment plants, governmental agencies, and university laboratories.	4507 4518 4526 7265 8575	8853 C7164R, S C31000B C31025B, C
Thermoluminescent Dosimetry (TLD)	The direct determination of X-, Gamma-, and Beta-radiation doses to afford personnel protection and to determine routine dosage levels in medical and biological treatments and studies. Energy stored in TLD's is proportional to dosage over a very wide range.	Hospitals, governmental agencies and laboratories, atomic power plants, industrial and biological laboratories	4507 4518 8575	

The listed photomultipliers are typical of those finding use in the different equipments. The listing is not all-inclusive and is intended to serve only as a general guide for initial type selection. Other photomultipliers may be satisfactory for the specified applications when all system requirements are considered.

Voltage-Distribution Considerations

The voltage distributions specified for the individual tube types are typical average distributions which are used to measure the tabulated characteristic values.

A complete discussion of all phases of voltage-divider design is contained in the **RCA Photomultiplier Manual, PT-61**. A few salient considerations are described below.

Interstage voltages for the tube electrodes may be supplied by individual sources but are usually obtained from resistive voltage-divider networks placed across the high-voltage supply. The power ratings of the individual resistors making up the network should be approximately twice that of the calculated dissipation values for circuit safety reasons. Resistors having tolerances of about 5% are satisfactory in most systems for circular-cage and focused in-line photomultipliers. Resistors having 10% tolerances may be used with venetian-blind tubes.

The voltage-divider arrangement should be located so that it will not affect tube operating temperature. Head-on type photomultipliers sometimes use zener diodes between cathode and dynode No.1 to provide constant voltage when tube sensitivity is varied by adjustment of supply voltage.

An important consideration is that the voltage-divider current should be maintained at a value of at least 10 times that of the expected average value of anode current. If this consider-

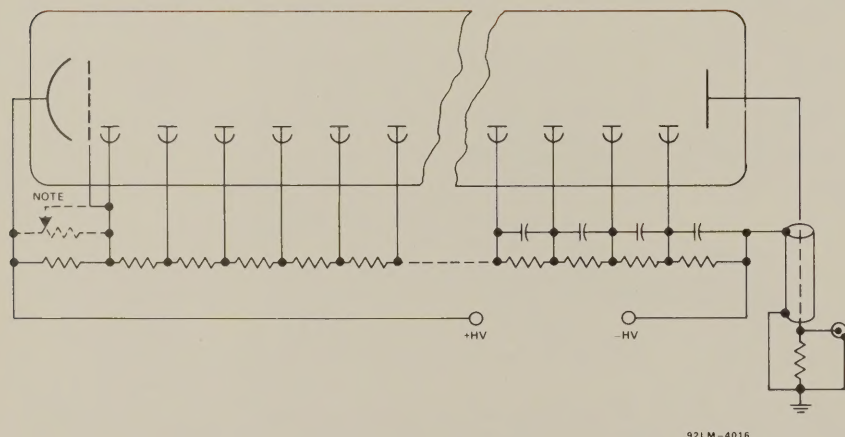
ation is not observed, deviation from linearity and limitations on anode-current response to pulsed light may occur. The latter effect may be reduced by connecting capacitors between the tube socket terminals for the last 3 or 4 dynode stages and anode return. The values of the capacitors will depend upon the shape and the amplitude of the anode-current pulse, and the time duration of the pulse, or train of pulses. When the output pulse is assumed to be rectangular in shape, the following formula applies:

$$C = 100 \frac{i \cdot t}{V}$$

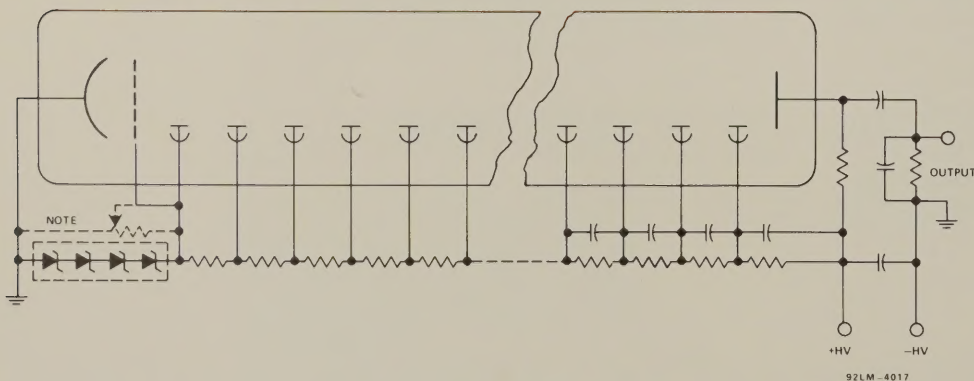
where C is in farads, i is the amplitude of the anode current in amperes, V is the voltage across the capacitor in volts, and t is the time duration of the pulse in seconds.

This formula applies for the anode-to-final dynode capacitor. The factor 100 is used to limit the voltage change across the capacitor to 1% maximum during a pulse. Capacitor values for preceding stages should take into account the smaller values of dynode currents in these stages. Conservatively, a factor of approximately 2 per stage is used. Capacitors are not required across those dynode stages where the dynode current is less than 1/10 of the current through the voltage-divider network.

Typical Voltage-Divider Arrangement for Fast Pulse Response and High Peak Current Systems.
Anode Return at Ground Potential.



Typical Voltage-Divider Arrangement for Scintillation Counting Systems.
Photocathode at Ground Potential.



Note:

In modern photomultipliers, the focusing electrode is normally connected to dynode No.1. In older tube types, the focusing electrode may be connected to the arm of a potentiometer, between cathode and dynode No.1, to permit adjustment for maximum anode current.

Cathode-to-Anode Voltage Distribution Chart

Distribution Code	Number of Stages	Voltage Distribution K, Dy1, Dy2, Dy3, ----- P
A	5	2, 1, 1, 1, 0.5, 0.83 [♣] , and 0.18 [▲]
B	6	2, 1, 1, 1, 1, 1, and 1
C	9	1, 1, 1, 1, 1, 1, 1, 1, 1, and 1
D	10	2, 1, 1, 1, 1, 1, 1, 1, 1, and 1
E		1.2, 1.2, 1.7, 1, 1, 1, 1, 1, 1, and 1
F		1.1, 1.2, 1.7, 1, 1, 1, 1, 1, 1, and 1
G		1.7, 1.3, 1.3, 1, 1, 1, 1, 1, 1, and 1
H		1.8, 1.4, 1.5, 1.2, 1, 1, 1, 1, 1, and 1
J		2, 1.4, 1, 1, 1, 1, 1, 1, 1, and 1
K		3, 1, 1, 1, 1, 1, 1, 1, 1, and 1
L	11	1, 1.4, 1, 1, 1, 1, 1, 1, 1, 1, and 1
M	12	1.2, 1.2, 1.7, 1, 1, 1, 1, 1, 1, 1, 1, and 1
N		2, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, and 1
P		1, 1, 1.7, 1, 1, 1, 1, 1, 1, 1, 1, and 1
Q		2, 1.4, 1, 1, 1, 1, 1, 1, 1, 1, 1, and 1
R		4, 1, 1.4, 1, 1, 1, 1, 1, 1, 1, 1, and 1
S		6, 1, 1.4, 1, 1, 1, 1, 1, 1, 1, 1, and 1
T		660 [★] , 1, 1.4, 1, 1, 1, 1, 1, 1, 1, 1, and 1
U		3, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, and 1
V		2, 1, 1.4, 1, 1, 1, 1, 1, 1, 1, 1, and 1
W	14	2, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1.25, 1.5, 1.75, and 2
X		3, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, and 1
Y		See technical data sheet for voltage distribution

♣ Between dynode No.5 and suppressor grid

▲ Between suppressor grid and ground

★ 660 volts

K, cathode; Dy, dynode; and P, anode

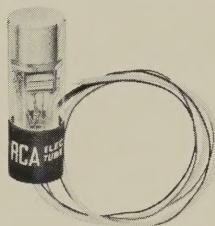
Photomultipliers with Integral Voltage-Divider Networks and Integral Voltage-Divider Networks and Shields (Special Line Series)

Almost all RCA photomultipliers can be supplied with integral electrostatic-magnetic shielding and/or voltage-divider networks. Those shown below are typical examples. Photomultipliers of the Special-Line Series supplied without shielding are classified as **configuration 1**, those with shielding as **configuration 2**. Three basic voltage-divider arrangements are available and are classified as **arrangement A**, **arrangement B**, and **arrangement C**. Arrangement A provides a voltage-divider network current of approximately $20\mu\text{A}$; B, $100\mu\text{A}$; and C, $1000\mu\text{A}$. The average values of anode current drawn from the tube should be $1/10$ of these values. Capacitors are connected across the latter stages of the tubes. These voltage-divider distributions can be modified, on special request, to meet specific customer needs.

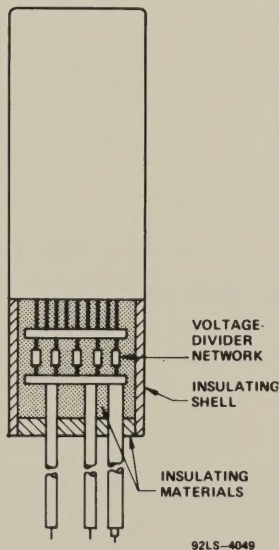
Tubes Without Shielding

Configuration 1

1A — Integral voltage-divider network only. Uses high value resistors in network and is recommended for applications requiring minimum power-supply drain. The average anode current drawn from the tube should be $2\mu\text{A}$, or less.



1B — Integral voltage-divider network only. Uses intermediate value resistors in network and is recommended for most applications. The average anode current drawn from the tube should be $10\mu\text{A}$, or less.



1C — Integral voltage-divider network only. Uses low value resistors in network and is recommended for applications requiring high linear average output current capability. The average anode current drawn from the tube should be $100\mu\text{A}$, or less.

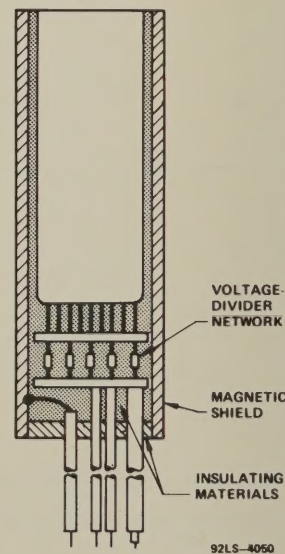
Tubes With Shielding

Configuration 2

2A — Integral voltage-divider network and shielding. Uses high value resistors in network and is recommended for applications requiring minimum power-supply drain. The average anode current drawn from the tube should be $2\mu\text{A}$, or less.



2B — Integral voltage-divider network and shielding. Uses intermediate value resistors in network and is recommended for most applications. The average anode current drawn from the tube should be $10\mu\text{A}$, or less.



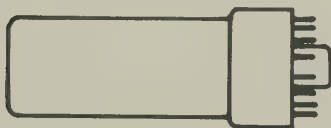
2C — Integral voltage-divider network and shielding. Use low value resistors in network and is recommended for applications requiring high linear average output current capability. The average anode current drawn from the tube should be $100\mu\text{A}$, or less.

As examples, the designation 7767/2C defines an RCA type 7767 having an integral shield and a voltage-divider arrangement providing a divider network current of $1000\mu\text{A}$. The designation 7767/1A defines a 7767 having a voltage-divider arrangement only which provides a divider network current of $20\mu\text{A}$.

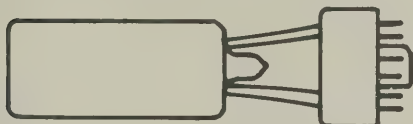
Basing Variants

RCA Photomultiplier Tubes are provided in the following basing configurations:

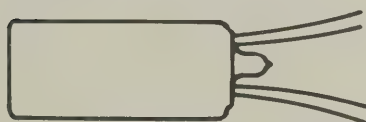
(1) Permanent Base Types



(2) Temporary Base Types



(3) Semiflexible Lead Types



Basing Variants of the basic configurations are available upon request. Specify the type number and one of the following modification (M) numbers:

- M1 — Remove base; leads tinned (change to configuration 3)
- M2 — Drop base to a minimum of 2" (change to configuration 2)
- M5 — Remove base; leads untinned (change to configuration 3)
- M7 — Base attached, but not cemented
- M8 — Base attached, but not cemented; leads tinned close to tube
- M9 — Remove base and ship with tube (change to configuration 3)

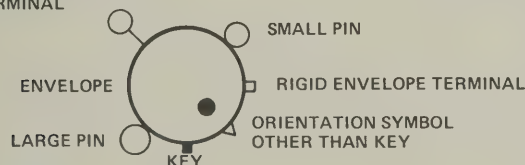
- M9 — Remove base and ship with tube (change to configuration 3)
- M10 — Attach base permanently (change to configuration 1)

- M3 — Attach permanent base (change to configuration 1)
- M4 — Solder additional wires to existing leads
- M6 — Attach temporary base (change to configuration 2)

Key to Terminal Connection Diagrams

Diagrams show terminals viewed from the base end of the tube.

FLEXIBLE ENVELOPE
TERMINAL



- C_b — Balancing capacitance
- DY — Dynode
- G — Grid
- IC — Internal connection (do not use)
- NC — No connection
- P — Anode
- K — Photocathode
- U — Unit
- — Gas-type tube

Key to Socket and Shield Manufacturers

Socket Manufacturers

- AL = Alden Products Company, 112 North Main Street, Brockton, MA 02403
- AM = Amphenol Corporation, Amphenol Industrial Division, 1830 S. 54th Ave., Chicago, IL 60650
- C = Cinch Manufacturing Company, 1501 Morse Ave., Elk Grove Village, IL 60007
- E = Hugh H. Eby Co., 4701 Germantown Ave., Philadelphia, PA 19144
- G = Garlock Inc., 602 North 10th St., Camden, NJ 08102
- L = Loranger Manufacturing Corp., Box 948, Warren, PA 16365
- RCA = RCA Corporation, Photomultiplier Marketing, Lancaster, PA 17604

Shield Manufacturers

- J = JAN Hardware Manufacturing Company, Inc., 47-27 36th St., Long Island City, NY 11101
- M = James Millen Mfg. Co., Inc., 150 Exchange St., Malden, MA 02148
- P = Magnetic Shield Division, Perfection Mica Company, 740 Thomas Drive, Bensenville, IL 60106

RCA Auxiliary Assemblies and Components

Assemblies

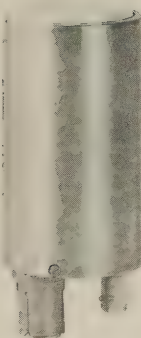


PF1011

An assembly composed of a selected RCA QUANTACON photomultiplier type 8852 (ERMA III photocathode), an annular permanent magnet affixed to the tube's faceplate, and a magnetic shield. This assembly, in effect, provides a photodetector having a useful photocathode diameter of only 2.5 mm and extremely low dark noise, yet retains all the attendant high-performance characteristics of the 2"-diameter 8852. This assembly has a typical dark noise count rate of only 2 cps at -20°C and is designed for Raman spectroscopy, astronomy, laser detection, and other single photon counting applications.

PF1012

This assembly is identical in construction to the PF1011 but it employs an RCA photomultiplier type 8850 (Bialkali photocathode). This assembly has a maximum dark noise count rate of 50 cps at 22°C , and is intended for star-tracking, astronomy, low level photon counting, and other applications requiring high sensitivity in the blue region of the spectrum in conjunction with extremely low noise.



AJ2175

An auxiliary assembly designed to provide the best possible time response from the 5-stage RCA QUANTACON photomultiplier type C31024. The assembly is composed of a teflon socket and a resistive voltage-divider arrangement housed in a metal container. The AJ2175 is supplied fitted with a coaxial signal output connector and a high voltage connector. Variants with additional signal connectors are available.

AJ2203

An auxiliary assembly designed to provide peak linear anode pulse currents of 100 mA, or more, from the C31024. This assembly is similar to the AJ2175 except for the voltage-divider network and the inclusion of network capacitors. Variants with additional signal connectors are available.

Sockets



AJ2144

A teflon socket designed for use with all 12-stage RCA photomultipliers employing the RCA 21-pin base. This socket is supplied with an unattached clamp ring which fits to either the top or bottom of its socket body to allow chassis mounting but may be discarded for other desired mounting arrangements.

AJ2145

A teflon socket designed specifically for the chassis mounting of all 12-stage RCA photomultipliers employing the RCA 21-pin base.

AJ2180

A light-tight teflon socket that is similar to the AJ2145. This socket is for use with all 12-stage RCA photomultipliers employing the RCA 21-pin base.



AJ2100

A teflon socket designed for chassis mounting of the 5-stage QUANTACON photomultiplier type C31024. The AJ2100 is supplied with the C31024.

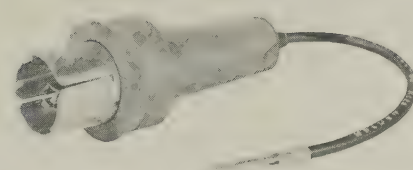
AJ2101

A teflon socket intended for chassis as well as any other desired mounting of the C31024. It is similar to the AJ2144. The AJ2101 can be supplied with the C31024, rather than the AJ2100, if requested.

Connectors

AJ2102

An anode cable assembly consisting of approximately 6" of RG174/U cable fitted with a GR874 connector on one end and a coaxial signal output connector (AJ2103) on the other end. The AJ2102 is designed for and supplied with the C31024.



Socket Adapters

AJ2132

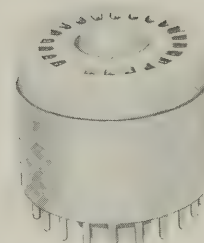
A teflon socket, voltage divider and capacitor network, and a JEDEC No.B20-102 base assembly that allows the replacement of 14-stage photomultipliers such as the 56AVP, 6810A, or 7264 by the high-performance 12-stage photomultiplier types 8575 or 8850.

AJ2143

A teflon socket, voltage divider and capacitor network, and a JEDEC No.B20-102 base assembly that allows the replacement of the 58AVP by the photomultiplier types 4522 or 8854.

AJ2143A

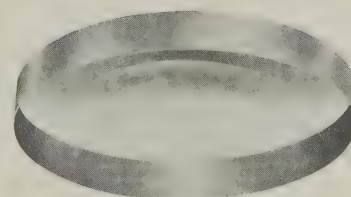
This adapter is identical with the AJ2143 but capacitors are not employed in the voltage divider network.



Faceplate Adapters

AJ2142

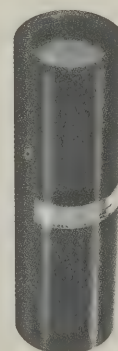
An acrylic plastic faceplate adapter (or light pipe) which allows efficient optical coupling between the curved faceplates of the 4522 or 8854 and flat surfaces.



Integrated Photodetection Assemblies

PF1023—Series

Multipurpose, self-contained photodetection systems featuring a 2"-diameter, 10-stage photomultiplier having an ERMA II photocathode. Each assembly includes a regulated, high stability—remotely programmable and self limiting for PMT protection. The entire assembly package is only 2.6" max. dia. by 8.0" max. length and weighs less than 2 pounds. Power input is provided from a bipolar ± 12 volt power source. Temperature compensation, hermetic sealing, magnetic and electrostatic shielding, and the ability to withstand shock and vibration permit operation under severe environmental conditions. Optical filter and/or aperture and signal conditioning amplifier may be customer specified. Complete external interface is achieved through a single connector.



Typical Characteristics at the Specified Supply Voltage and 22° C

Spectral Response ^a	Nominal Tube Diameter Inches	Number of Stages	Viewing Configuration ^b	Cage Structure ^c	RCA Type No.	Page No.	Maximum Ratings		Sensitivity						Current Amplification (Approx.) x 10 ⁶	Anode Dark
							Supply Voltage (E) V	Average Anode Current mA	Supply Voltage V	Radiant		Luminous		Current n/A @ Anode Luminous Sensitivity A/lm		
										Anode A/W	Cathode mA/W	Anode A/lm	Cathode μ A/lm			
101(S-1)	3/4	10	H	I	C70102B	38	1500	0.01	1250	310	2.8	3.3	30	0.11	800@4	
	1-1/8	9	S	C	C31004A	26	1500	0.01	1250	235	1.9	2.5	20	0.125	300@2	
	1-1/2	10	H	C	7102	42	1500	0.01	1250	660	2.8	7	30	0.23	1900@4	
	2	12	H	I	C70007A	54	2000	0.01	1250	940	2.8	10	30	0.33	400@4	
102(S-4)	1/2	9	S	C	8571	24	1250	0.02	1000	73,000	34	75	35	2.1	2@20	
	1-1/8	9	S	C	1P21	26	1250	0.1	1000	120,000	40	120	40	3	1@20	
		9	S	C	931A	26	1250	1.0	1000	80,000	40	80	40	2	5@20	
		9	S	C	4471	26	1250	1.0	1000	100,000	40	100	40	2.5	5@20	
		9	S	C	4472	26	1250	1.0	1000	100,000	40	100	40	2.5	5@20	
		9	S	C	4473	26	1250	0.1	1000	160,000	40	160	40	4	1@20	
		9	S	C	6328	26	1250	0.1	1000	35,000	—	35	—	—	—	
		9	S	C	7117	26	1250	0.1	1000	35,000	—	35	—	—	—	
		9	S	C	C7075J	26	1250	0.1	1000	80,000	40	80	40	2	5@20	
103	1-1/8	9	S	C	1P28/V1	28	1250	0.5	1000	160,000	48	200	60	3.3	2@40	
		9	S	C	1P28A/V1	28	1250	0.5	1000	160,000	48	200	60	3.3	2@40	
104(S-5)	1/2	9	S	C	C70129H	24	1250	0.02	1000	44,000	44	35	35	1	20@20	
	1-1/8	9	S	C	1P28	28	1250	0.5	1000	125,000	50	100	40	2.5	5@20	
		9	S	C	1P28A	28	1250	0.5	1000	250,000	50	200	40	5	5@20	
105(S-8)	1-1/8	9	S	C	1P22	28	1250	1.0	1000	7500	2.3	10	3	3.3	6@0.8	
106(S-10)	2	10	H	C	6217	52	1250	0.75	1000	50,000	20	100	40	2.5	28@20	
107(S-11)	3/4	6	H	I	7764	36	1500	0.5	1200	480	48	0.6	60	0.01	2@0.3	
		10	H	I	4460	38	1500	0.5	1250	6000	48	7.5	60	0.125	6@7.5	
		10	H	I	7767	36	1500	0.5	1250	13,000	48	16	60	0.27	4@7.5	
		10	H	I	C70102E	38	1500	0.5	1250	8800	56	11	70	0.16	1.4@7.5	
		12	H	I	4802	36	2000	0.5	1500	160,000	60	200	75	2.7	200@200	
	1-1/2	10	H	C	2060	42	1250	0.75	1000	36,000	36	45	45	1	4.5@20	
		10	H	C	2067	44	1250	0.75	1000	16,200	60	20	74	0.27	2.6@20	
		10	H	C	4438	44	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
		10	H	C	4439	44	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
		10	H	C	4440	44	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
		10	H	C	4441	46	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
		10	H	C	4441A	46	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
		10	H	C	4461	46	1500	1.0	1250	8000	48	10	60	0.17	5@10	
		10	H	C	6199	42	1250	0.75	1000	36,000	36	45	45	1	4.5@20	
		10	H	C	C7151N	48	1600	0.5	1500	57,000	70	70	85	0.82	0.8@20	
		10	H	C	C70132B	48	1600	0.5	1500	57,000	70	70	85	0.82	0.8@20	
	2	10	H	C	2020	52	1500	2.0	1250	4800	40	6	50	0.12	4@20	
		10	H	C	2061	50	1500	2.0	1250	—	64	—	80	—	—	
		10	H	V	2063	62	2000	2.0	1500	—	56	—	70	—	—	
		10	H	C	5819	52	1250	0.75	1000	80,000	40	100	50	2	6@20	
		10	H	C	6342A	50	1500	2.0	1250	25,000	64	31	80	0.39	4@20	
		10	H	C	6655A	52	1250	0.75	1000	96,000	61	120	76	1.6	6@20	
		10	H	I	7746	54	2500	2.0	2000	960,000	56	1200	70	17	250@230	
		10	H	V	8053	62	2000	2.0	1500	34,000	56	42	70	0.6	4@9	
		12	H	I	7850	54	2600	2.0	1800	510,000	56	640	70	9.1	64@160	
		14	H	I	6810A	54	2400	2.0	2000	3,000,000	56	3800	70	54	1000@2000	
	3	10	H	V	2064B	64	2000	2.0	1500	—	64	—	80	—	—	
		10	H	V	8054	64	2000	2.0	1500	35,000	64	43	80	0.54	4@9	
	5	10	H	V	2065	68	2000	2.0	1500	—	88	—	110	—	—	
		10	H	V	8055	68	2000	2.0	1500	35,000	88	44	110	0.4	4@9	
108(S-13)	2	10	H	C	6903	52	1250	0.75	1000	72,000	48	90	60	1.5	10@20	
109(S-19)	1-1/8	9	S	C	7200	28	1250	0.5	1000	65,000	65	40	40	1	4@20	
110(S-20)	3/4	10	H	I	8644	34	2100	0.5	1500	6900	64	16	150	0.11	3@30	
		10	H	I	8645	34	1800	0.1	1500	6900	64	16	150	0.11	3@30	
	1-1/2	10	H	C	C70114C	46	1800	1.0	1500	10,800	77	25	180	0.14	4@10	
	2	10	H	V	4463	62	2500	1.0	2000	11,000	68	25	160	0.16	4.8@12	
		10	H	I	7326	54	2400	1.0	1800	37,500	64	88	150	0.59	3@20	
		14	H	I	7265	54	3000	1.0	2400	3,100,000	64	7200	150	48	50@1000	
	3	10	H	V	4464	64	2500	1.0	2000	11,000	68	25	160	0.16	4.8@12	
	5	10	H	V	4465	68	2500	1.0	2000	11,000	68	25	160	0.16	4.8@12	
111	1-1/2	10	DW	C	4526	32	2000	0.1	1250	4400	89	15	300	0.05	2@20	
112	3	14	S	I	C70045C	32	6000	1.0	5000	—	60	—	140	5	500@1000	
113	2	12	H	I	C31000A	60	3000	1.0	2000	270,000	77	700	200	3.5	5@200	
		12	H	I	C31000B	60	3000	1.0	2000	270,000	77	700	200	3.5	5@200	
114	3/4	10	H	I	C70042D	34	2100	0.5	1500	4300	60	10	140	0.071	6@30	

‡ A maximum supply-voltage value within the specified range is supplied with each C31024.

* The values 0.9 and 9 are the ratios of the anode current by the light flux value that is incident on a Corning C.S. No. 5-58 filter (1/2 stock thickness). The filter is interposed between a 2870° K light source and the tube.

a See bar graphs on pages 83 and 84 and spectral-response characteristic curves on page 85.

b Viewing configuration: H, head-on; S, side-on; and DW, dormer-window.

c Cage structures: C, circular-cage; I, in-line; and V, venetian-blind.

Spectral Response ^a	Nominal Tube Diameter Inches	Number of Stages	Viewing Configuration ^b	Cage Structure ^c	RCA Type No.	Page No.	Typical Characteristics at the Specified Supply Voltage and 22° C									
							Maximum Ratings		Sensitivity				Current Amplification (Approx.) x 10 ⁶	Anode Dark Current n/A @ Anode Luminous Sensitivity A/lm		
							Supply Voltage (E) V	Average Anode Current mA	Supply Voltage V	Radiant		Luminous				
										Anode A/W	Cathode mA/W	Anode A/lm			Cathode uA/lm	
115	3/4	10	H	I	4516	36	1800	0.5	1500	56,000	71	47	60	0.8	0.2@7	
		10	H	I	C70102M	38	1800	0.5	1500	32,000	79	27	67	0.4	0.2@7	
	1	10	H	C	C31016F	40	1500	0.02	1250	36,000	79	30	67	0.45	0.5@7	
		10	H	C	4517	42	1800	0.5	1500	56,000	79	47	67	0.7	0.2@7	
	1-1/2	10	H	C	C7151Q	48	1800	0.5	1500	39,000	79	33	67	0.49	0.3@7	
		10	H	C	C70114F	46	1800	0.5	1500	39,000	79	33	67	0.49	0.3@7	
	2	10	H	C	C70132A	48	1800	0.5	1500	65,000	79	55	67	0.82	0.4@6.7	
		5	H	I	C31024	58	2750 to 4500	0.1	3000	430,000	87	360	73	5	—	
	3	10	H	C	4518	50	2000	0.5	1500	39,000	79	33	67	0.49	0.24@7	
		10	H	V	4523	62	2500	0.5	1500	32,000	71	27	60	0.45	0.5@13	
		10	H	V	4524	64	2500	0.5	1500	32,000	71	27	60	0.45	1@13	
		10	H	V	4525	68	2500	0.5	1500	32,000	80	27	67	0.4	1.5@13	
		10	H	V	C31027	70	2000	0.5	1500	13,000	88	11.5	77	0.15	2@0.9*	
		12	H	V	C31029	70	2500	0.5	1750	130,000	88	115	77	1.5	20@9*	
116	2	12	H	I	4507	60	2500	0.2	1500	180,000	97	160	85	1.9	0.2@50	
		12	H	I	8575	60	3000	0.2	2000	970,000	97	850	85	10	1@200	
		12	H	I	8850	58	3000	0.2	2000	710,000	97	620	85	7.3	0.6@200	
		12	H	I	8851	58	3000	0.2	2000	710,000	97	620	85	7.3	0.6@200	
117	1-1/2	10	H	C	C70114J	46	1800	0.5	1500	39,000	79	33	67	0.49	0.3@7	
118	3	14	S	I	C70045D	32	6000	1.0	5000	—	72	—	—	10	1000@10,000	
	2	12	H	I	C31000N	58	3000	0.2	2000	710,000	97	620	85	7.3	0.6@200	
5	12	H	I	C31000Z	60	3000	0.2	2000	970,000	97	850	85	10	1@200		
	14	H	I	4522	68	3000	0.5	2000	2,600,000	88	2300	77	30	60@2000		
	14	H	I	8854	68	3000	0.5	2000	3,500,000	88	3100	77	40	60@2000		
119	2	12	H	I	8852	58	2500	1.0	1500	16,000	37	100	230	0.43	10@100	
		12	H	I	8853	58	2500	1.0	1500	16,000	37	100	230	0.43	10@100	
120	2	10	H	V	8664	62	2000	2.0	1500	18,000	69	17	67	0.25	1@7.5	
		10	H	V	8664/V1	62	2000	2.0	1500	18,000	69	17	67	0.25	1@7.5	
	3	10	H	V	C31009	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
		10	H	V	C31009A	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
		10	H	V	C31009B	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
		10	H	V	C31009C	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
		10	H	V	C31012	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
		10	H	V	C31012A	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
		10	H	V	C31012B	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
		10	H	V	C31012C	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
121	3/4	12	H	I	C31005	36	2500	0.5	2100	9200 min. @ 253.7 nm	9.2 min. @ 253.7 nm	—	—	1 min.	0.1@ 3000A/W	
122	3	10	H	V	4521	64	2000	0.5	1500	19,000	87	18	83	0.22	2@7.5	
123	1/2	9	S	C	C70129G	24	1250	0.02	1000	21,000	31	20	30	0.67	8@15	
1-1/8	9	S	C	C31022	28	1250	0.1	1000	160,000	48	200	60	3.3	2@40		
	124	3/4	10	H	I	C70102N	38	1500	0.5	1250	4800	72	6	90	0.067	2@7.5
125	3/4	12	H	I	C70128	36	1800	0.5	1500	3000 @ 253.7 nm	15 @ 253.7 nm	—	—	0.2	0.5@ 3000A/W	
127	1-1/2	10	H	C	C7151U	44	1250	0.75	1000	8200	25	20	60	0.33	10@40	
128	1-1/8	9	S	C	C31025C	30	1500	0.01	1250	2700	61	20	450	0.045	0.3@10	
	2	11	H	I	C31034	56	2000	0.01	1500	41,000	68	300	500	0.6	3@100	
11	11	H	I	C31034A	56	2000	0.01	1500	62,000	155	400	1000	0.4	3@100		
	129	1-1/8	9	S	C	C31025B	30	1800	0.01	1250	2000	48	7	170	0.041	0.4@10
131	3/4	10	H	I	C70042K	34	2100	0.5	1500	3600	45	20	250	0.08	6@30	
1	12	H	I	C31026	40	2200	0.5	1800	26,000	43	150	250	0.6	40@50		
	132	3/4	10	H	I	C70042R	34	2100	0.5	1500	5500	44	25	200	0.125	2@30
1-1/2	10	H	C	C7151W	42	1500	0.5	1250	10,000	40	50	200	0.25	1@20		
	2	10	H	C	C7164R	50	1500	0.5	1250	20,000	40	100	200	0.5	30@150	
	10	H	C	C7164S	50	1500	0.5	1250	20,000	40	100	200	0.5	30@150		
133	2	12	H	I	C31000M	58	3000	0.2	2000	710,000	97	620	85	7.3	0.6@200	
		12	H	I	C31000AH	60	3000	0.2	2000	970,000	97	850	85	10	1@200	
134	1-1/8	9	S	C	C31025J	30	1500	0.01	1250	2700	54	20	400	0.05	0.3@10	
136	1-1/8	9	S	C	4552	28	1250	0.5	1000	84,000	54	100	65	1.5	0.8@20	
		9	S	C	4555	28	1250	0.5	1000	170,000	54	—	—	3	0.8@800V	
137	1-1/2	10	H	C	C7151Y	44	1500	0.5	1250	2400	40	12	200	0.06	3@10	
138	1-1/2	10	H	C	C7151Z	44	1500	0.5	1250	30,000	73	70	170	0.41	10@40	
139	3/4	10	H	I	C70042S	38	1800	0.5	1500	15,000	60	20	80	0.25	1@10	
1	10	H	C	C31016G	40	1800	0.02	1500	12,000	60	17	80	0.2	0.5@20		
	1-1/2	10	H	C	C7151AA	42	1800	0.5	1500	19,000	60	25	80	0.31	0.4@10	
2	12	H	I	C31000AJ	60	2500	0.2	2000	64,000	60	85	80	1.2	3@50		
	1-1/8	9	S	C	C31025K	30	1500	0.01	1250	1700	43	12	300	0.04	1@5	
140	2	11	H	I	C31034B	56	2000	0.01	1500	14,000	57	100	400	0.25	10@100	
	1-1/8	9	S	C	C31025M	30	1500	0.01	1250	1900	31	12	200	0.06	1@5	
141	2	11	H	I	C31034C	56	2000	0.01	1500	16,000	47	100	300	0.33	10@100	
	1-1/8	9	S	C	C31025N	30	1500	0.01	1250	1700	30	6	100	0.06	1@5	
142	2	11	H	I	C31034D	56	2000	0.01	1500	17,000	42	60	150	0.4	10@50	

Typical Characteristics at the Specified Supply Voltage and 22° C																
Nominal Tube Diameter Inches	Spectral Response ^a	Number of Stages	Viewing Configu- ration ^b	Cage Struc- ture ^c	RCA Type No.	Page No.	Maximum Ratings		Supply Voltage V	Sensitivity				Current Amplifi- cation (Approx.) x 10 ⁶	Anode Dark Current n/A @ Anode Luminous Sensitivity A/lm	
							Supply Voltage (E) V	Average Anode Current mA		Radiant		Luminous				
										Anode A/W	Cathode mA/W	Anode A/lm	Cathode uA/lm			
1/2	102(S-4)	9	S	C	8571	24	1250	0.02	1000	73,000	34	75	35	2.1	2@20	
	104(S-5)	9	S	C	C70129H	24	1250	0.02	1000	44,000	44	35	35	1	20@20	
	123	9	S	C	C70129G	24	1250	0.02	1000	21,000	31	20	30	0.67	8@15	
3/4	101(S-1)	10	H	I	C70102B	38	1500	0.01	1250	310	2.8	3.3	30	0.11	800@4	
	107(S-11)	6	H	I	7764	36	1500	0.5	1200	480	48	0.6	60	0.01	2@0.3	
		10	H	I	4460	38	1500	0.5	1250	6000	48	7.5	60	0.125	6@7.5	
		10	H	I	7767	36	1500	0.5	1250	13,000	48	16	60	0.27	4@7.5	
		10	H	I	C70102E	38	1500	0.5	1250	8800	56	11	70	0.16	1.4@7.5	
		12	H	I	4802	36	2000	0.5	1500	160,000	60	200	75	2.7	200@200	
110(S-20)		10	H	I	8644	34	2100	0.5	1500	6900	64	16	150	0.11	3@30	
		10	H	I	8645	34	1800	0.1	1500	6900	64	16	150	0.11	3@30	
	114	10	H	I	C70042D	34	2100	0.5	1500	4300	60	10	140	0.071	6@30	
115		10	H	I	4516	36	1800	0.5	1500	56,000	71	47	60	0.8	0.2@7	
		10	H	I	C70102M	38	1800	0.5	1500	32,000	79	27	67	0.4	0.2@7	
	121	12	H	I	C31005	36	2500	0.5	2100	9200	9.2	—	—	1	0.1@	
										min. @ 253.7 nm	min. @ 253.7 nm		min.	3000A/W		
124	10	H	I	C70102N	38	1500	0.5	1250	4800	72	6	90	0.067	2@7.5		
125	12	H	I	C70128	36	1800	0.5	1500	3000	15	—	—	0.2	0.5@	3000A/W	
									@253.7 nm	@253.7 nm						
131	10	H	I	C70042K	34	2100	0.5	1500	3600	45	20	250	0.08	6@30		
132	10	H	I	C70042R	34	2100	0.5	1500	5500	44	25	200	0.125	2@30		
139	10	H	I	C70042S	38	1800	0.5	1500	15,000	60	20	80	0.25	1@10		
1	115	10	H	C	C31016F	40	1500	0.02	1250	36,000	79	30	67	0.45	0.5@7	
	131	12	H	I	C31026	40	2200	0.5	1800	26,000	43	150	250	0.6	40@50	
	139	10	H	C	C31016G	40	1800	0.02	1500	12,000	60	17	80	0.2	0.5@20	
1-1/8	101(S-1)	9	S	C	C31004A	26	1500	0.01	1250	235	1.9	2.5	20	0.125	300@2	
	102(S-4)	9	S	C	1P21	26	1250	0.1	1000	120,000	40	120	40	3	1@20	
		9	S	C	931A	26	1250	1.0	1000	80,000	40	80	40	2	5@20	
		9	S	C	4471	26	1250	1.0	1000	100,000	40	100	40	2.5	5@20	
		9	S	C	4472	26	1250	1.0	1000	100,000	40	100	40	2.5	5@20	
		9	S	C	4473	26	1250	0.1	1000	160,000	40	160	40	4	1@20	
		9	S	C	6328	26	1250	0.1	1000	35,000	—	35	—	—	—	
		9	S	C	7117	26	1250	0.1	1000	35,000	—	35	—	—	—	
		9	S	C	C7075J	26	1250	0.1	1000	80,000	40	80	40	2	5@20	
103		9	S	C	1P28/V1	28	1250	0.5	1000	160,000	48	200	60	3.3	2@40	
		9	S	C	1P28A/V1	28	1250	0.5	1000	160,000	48	200	60	3.3	2@40	
	104(S-5)	9	S	C	1P28	28	1250	0.5	1000	125,000	50	100	40	2.5	5@20	
		9	S	C	1P28A	28	1250	0.5	1000	250,000	50	200	40	5	5@20	
	105(S-8)	9	S	C	1P22	28	1250	1.0	1000	7500	2.3	10	3	3.3	6@0.8	
	109(S-19)	9	S	C	7200	28	1250	0.5	1000	65,000	65	40	40	1	4@20	
123		9	S	C	C31022	28	1250	0.1	1000	160,000	48	200	60	3.3	2@40	
	128	9	S	C	C31025C	30	1500	0.01	1250	2700	61	20	450	0.045	0.3@10	
	129	9	S	C	C31025B	30	1800	0.01	1250	2000	48	7	170	0.041	0.4@10	
134		9	S	C	C31025J	30	1500	0.01	1250	2700	54	20	400	0.05	0.3@10	
	136	9	S	C	4552	28	1250	0.5	1000	84,000	54	100	65	1.5	0.8@20	
		9	S	C	4555	28	1250	0.5	1000	170,000	54	—	—	3	0.8@800V	
140		9	S	C	C31025K	30	1500	0.01	1250	1700	43	12	300	0.04	1@5	
	141	9	S	C	C31025M	30	1500	0.01	1250	1900	31	12	200	0.06	1@5	
	142	9	S	C	C31025N	30	1500	0.01	1250	1700	30	6	100	0.06	1@5	
1-1/2	101(S-1)	10	H	C	7102	42	1500	0.01	1250	660	2.8	7	30	0.23	1900@4	
	107(S-11)	10	H	C	2060	42	1250	0.75	1000	36,000	36	45	45	1	4.5@20	
		10	H	C	2067	44	1250	0.75	1000	16,200	60	20	74	0.27	2.6@20	
		10	H	C	4438	44	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
		10	H	C	4439	44	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
		10	H	C	4440	44	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
		10	H	C	4441	46	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
		10	H	C	4441A	46	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
		10	H	C	4461	46	1500	1.0	1250	8000	48	10	60	0.17	5@10	
		10	H	C	6199	42	1250	0.75	1000	36,000	36	45	45	1	4.5@20	
		10	H	C	C7151N	48	1600	0.5	1500	57,000	70	70	85	0.82	0.8@20	
		10	H	C	C70132B	48	1600	0.5	1500	57,000	70	70	85	0.82	0.8@20	
110(S-20)	10	H	C	C70114C	46	1800	1.0	1500	10,800	77	25	180	0.14	4@10		
111	10	DW	C	4526	32	2000	0.1	1250	4400	89	15	300	0.05	2@20		

^a A maximum supply-voltage value within the specified range is supplied with each C31024.

* The values 0.9 and 9 are the ratios of the anode current by the light flux value that is incident on a Corning C.S. No. 5-58 filter (1/2 stock thickness). The filter is interposed between a 2870° K light source and the tube.

^a See bar graphs on pages 83 and 84 and spectral-response characteristic curves on page 85.

^b Viewing configuration: H, head-on; S, side-on; and DW, dormer-window.

^c Cage structures: C, circular-cage; I, in-line; and V, venetian-blind.

Typical Characteristics at the Specified Supply Voltage and 22° C

Nominal Tube Diameter Inches	Spectral Response ^a	Number of Stages	Viewing Configu- ration ^b	Cage Struc- ture ^c	RCA Type No.	Page No.	Maximum Ratings		Supply Voltage V	Sensitivity				Current Amplifi- cation (Approx.) x 10 ⁶	Anode Dark Current n/A @ Anode Luminous Sensitivity A/lm	
							Supply Voltage (E) V	Average Anode Current mA		Radiant		Luminous				
										Anode A/W	Cathode mA/W	Anode A/lm	Cathode uA/lm			
1-1/2 (Cont'd)	115	10	H	C	4517	42	1800	0.5	1500	56,000	79	47	67	0.7	0.2@7	
		10	H	C	C7151Q	48	1800	0.5	1500	39,000	79	33	67	0.49	0.3@7	
		10	H	C	C70114F	46	1800	0.5	1500	39,000	79	33	67	0.49	0.3@7	
		10	H	C	C70132A	48	1800	0.5	1500	65,000	79	55	67	0.82	0.4@6.7	
	117	10	H	C	C70114J	46	1800	0.5	1500	39,000	79	33	67	0.49	0.3@7	
	127	10	H	C	C7151U	44	1250	0.75	1000	8200	25	20	60	0.33	10@40	
	132	10	H	C	C7151W	42	1500	0.5	1250	10,000	40	50	200	0.25	1@20	
	137	10	H	C	C7151Y	44	1500	0.5	1250	2400	40	12	200	0.06	3@10	
	138	10	H	C	C7151Z	44	1500	0.5	1250	30,000	73	70	170	0.44	10@40	
	139	10	H	C	C7151AA	42	1800	0.5	1500	19,000	60	25	80	0.31	0.4@10	
	2	101(S-1)	12	H	I	C70007A	54	2000	0.01	1250	940	2.8	10	30	0.33	400@4
		106(S-10)	10	H	C	6217	52	1250	0.75	1000	50,000	20	100	40	2.5	28@20
		107(S-11)	10	H	C	2020	52	1500	2.0	1250	4800	40	6	50	0.12	4@20
			10	H	C	2061	50	1500	2.0	1250	—	64	—	80	—	—
		10	H	V	2063	62	2000	2.0	1500	—	56	—	70	—	—	
		10	H	C	5819	52	1250	0.75	1000	80,000	40	100	50	2	6@20	
		10	H	C	6342A	50	1500	2.0	1250	25,000	64	31	80	0.39	4@20	
		10	H	C	6655A	52	1250	0.75	1000	96,000	61	120	76	1.6	6@20	
		10	H	I	7746	54	2500	2.0	2000	960,000	56	1200	70	17	250@230	
		10	H	V	8053	62	2000	2.0	1500	34,000	56	42	70	0.6	4@9	
		12	H	I	7850	54	2600	2.0	1800	510,000	56	640	70	9.1	64@160	
14		H	I	6810A	54	2400	2.0	2000	3,000,000	56	3800	70	54	1000@2000		
108(S-13)	10	H	C	6903	52	1250	0.75	1000	72,000	48	90	60	1.5	10@20		
110(S-20)	10	H	V	4463	62	2500	1.0	2000	11,000	68	25	160	0.16	4.8@12		
	10	H	I	7326	54	2400	1.0	1800	37,500	64	88	150	0.59	3@20		
	14	H	I	7265	54	3000	1.0	2400	3,100,000	64	7200	150	48	50@1000		
113	12	H	I	C31000A	60	3000	1.0	2000	270,000	77	700	200	3.5	5@200		
	12	H	I	C31000B	60	3000	1.0	2000	270,000	77	700	200	3.5	5@200		
115	5	H	I	C31024	58	2750	0.1	3000	430,000	87	360	73	5	—		
3	116	10	H	C	4518	50	2000	0.5	1500	39,000	79	33	67	0.49	0.24@7	
		10	H	V	4523	62	2500	0.5	1500	32,000	71	27	60	0.45	0.5@13	
		12	H	I	4507	60	2500	0.2	1500	180,000	97	160	85	1.9	0.2@50	
		12	H	I	8575	60	3000	0.2	2000	970,000	97	850	85	10	1@200	
	118	12	H	I	8850	58	3000	0.2	2000	710,000	97	620	85	7.3	0.6@200	
		12	H	I	8851	58	3000	0.2	2000	710,000	97	620	85	7.3	0.6@200	
		12	H	I	C31000N	58	3000	0.2	2000	710,000	97	620	85	7.3	0.6@200	
		12	H	I	C31000Z	60	3000	0.2	2000	970,000	97	850	85	10	1@200	
	119	12	H	I	8852	58	2500	1.0	1500	16,000	37	100	230	0.43	10@100	
		12	H	I	8853	58	2500	1.0	1500	16,000	37	100	230	0.43	10@100	
	120	10	H	V	8664	62	2000	2.0	1500	18,000	69	17	67	0.25	1@7.5	
		10	H	V	8664/V1	62	2000	2.0	1500	18,000	69	17	67	0.25	1@7.5	
	128	11	H	I	C31034	56	2000	0.01	1500	41,000	68	300	500	0.6	3@100	
		11	H	I	C31034A	56	2000	0.01	1500	62,000	155	400	1000	0.4	3@100	
	132	10	H	C	C7164R	50	1500	0.5	1250	20,000	40	100	200	0.5	30@150	
		10	H	C	C7164S	50	1500	0.5	1250	20,000	40	100	200	0.5	30@150	
	133	12	H	I	C31000M	58	3000	0.2	2000	710,000	97	620	85	7.3	0.6@200	
		12	H	I	C31000AH	60	3000	0.2	2000	970,000	97	850	85	10	1@200	
	139	12	H	I	C31000AJ	60	2500	0.2	2000	64,000	60	85	80	1.2	3@50	
	140	11	H	I	C31034B	56	2000	0.01	1500	14,000	57	100	400	0.25	10@100	
	141	11	H	I	C31034C	56	2000	0.01	1500	16,000	47	100	300	0.33	10@100	
142	11	H	I	C31034D	56	2000	0.01	1500	17,000	42	60	150	0.4	10@50		
5	107(S-11)	10	H	V	2064B	64	2000	2.0	1500	—	64	—	80	—	—	
		10	H	V	8054	64	2000	2.0	1500	35,000	64	43	80	0.54	4@9	
	110(S-20)	10	H	V	4464	64	2500	1.0	2000	11,000	68	25	160	0.16	4.8@12	
	112	14	S	I	C70045C	32	6000	1.0	5000	—	60	—	140	5	500@1000	
	115	10	H	V	4524	64	2500	0.5	1500	32,000	71	27	60	0.45	1@13	
	117	14	S	I	C70045D	32	6000	1.0	5000	—	72	—	—	10	1000@10,000	
	120	10	H	V	C31009	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
		10	H	V	C31009A	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
		10	H	V	C31009B	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
		10	H	V	C31009C	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
		10	H	V	C31012	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
		10	H	V	C31012A	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
		10	H	V	C31012B	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
		10	H	V	C31012C	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
	122	10	H	V	4521	64	2000	0.5	1500	19,000	87	18	83	0.22	2@7.5	
107(S-11)	10	H	V	2065	68	2000	2.0	1500	—	88	—	110	—	—		
	10	H	V	8055	68	2000	2.0	1500	35,000	88	44	110	0.4	4@9		
	110(S-20)	10	H	V	4465	68	2500	1.0	2000	11,000	68	25	160	0.16	4.8@12	
	115	10	H	V	4525	68	2500	0.5	1500	32,000	80	27	67	0.4	1.5@13	
		10	H	V	C31027	70	2000	0.5	1500	13,000	88	11.5	77	0.15	2@0.9*	
		12	H	V	C31029	70	2500	0.5	1750	130,000	88	115	77	1.5	20@9*	
118	14	H	I	4522	68	3000	0.5	2000	2,600,000	88	2300	77	30	60@2000		
	14	H	I	8854	68	3000	0.5	2000	3,500,000	88	3100	77	40	60@2000		

RCA Photomultipliers

Preliminary Selection Guides

For Photomultipliers by Number of Stages (Gain)

							Typical Characteristics at the Specified Supply Voltage and 22° C									
Number of Stages	Nominal Tube Diameter Inches	Spectral Response ^a	Viewing Configuration ^b	Cage Structure ^c	RCA Type No.	Page No.	Maximum Ratings		Supply Voltage V	Sensitivity				Current Amplification (Approx.) x 10 ⁶	Anode Dark Current nA @ Anode Luminous Sensitivity A/lm	
							Supply Voltage (E) V	Average Anode Current mA		Radiant		Luminous				
										Anode A/W	Cathode mA/W	Anode A/lm	Cathode uA/lm			
5	2	115	H	I	C31024	58	2750 to 4500*	0.1	3000	430,000	87	360	73	5	—	
6	3/4	107(S-11)	H	I	7764	36	1500	0.5	1200	480	48	0.6	60	0.01	2@0.3	
9	1/2	102(S-4)	S	C	8571	24	1250	0.02	1000	73,000	34	75	35	2.1	2@20	
		104(S-5)	S	C	C70129H	24	1250	0.02	1000	44,000	44	35	35	1	20@20	
		123	S	C	C70129G	24	1250	0.02	1000	21,000	31	20	30	0.67	8@15	
	1-1/8	101(S-1)	S	C	C31004A	26	1500	0.01	1250	235	1.9	2.5	20	0.125	300@2	
		102(S-4)	S	C	1P21	26	1250	0.1	1000	120,000	40	120	40	3	1@20	
			S	C	931A	26	1250	1.0	1000	80,000	40	80	40	2	5@20	
			S	C	4471	26	1250	1.0	1000	100,000	40	100	40	2.5	5@20	
			S	C	4472	26	1250	1.0	1000	100,000	40	100	40	2.5	5@20	
			S	C	4473	26	1250	0.1	1000	160,000	40	160	40	4	1@20	
			S	C	6328	26	1250	0.1	1000	35,000	—	35	—	—	—	
			S	C	7117	26	1250	0.1	1000	35,000	—	35	—	—	—	
			S	C	C7075J	26	1250	0.1	1000	80,000	40	80	40	2	5@20	
		103	S	C	1P28/V1	28	1250	0.5	1000	160,000	48	200	60	3.3	2@40	
			S	C	1P28A/V1	28	1250	0.5	1000	160,000	48	200	60	3.3	2@40	
		104(S-5)	S	C	1P28	28	1250	0.5	1000	125,000	50	100	40	2.5	5@20	
			S	C	1P28A	28	1250	0.5	1000	250,000	50	200	40	5	5@20	
		105(S-8)	S	C	1P22	28	1250	1.0	1000	7500	2.3	10	3	3.3	6@0.8	
		109(S-19)	S	C	7200	28	1250	0.5	1000	65,000	65	40	40	1	4@20	
		123	S	C	C31022	28	1250	0.1	1000	160,000	48	200	60	3.3	2@40	
		128	S	C	C31025C	30	1500	0.01	1250	2700	61	20	450	0.045	0.3@10	
		129	S	C	C31025B	30	1800	0.01	1250	2000	48	7	170	0.041	0.4@10	
		134	S	C	C31025J	30	1500	0.01	1250	2700	54	20	400	0.05	0.3@10	
		136	S	C	4552	28	1250	0.5	1000	84,000	54	100	65	1.5	0.8@20	
			S	C	4555	28	1250	0.5	1000	170,000	54	—	—	3	0.8@800V	
		140	S	C	C31025K	30	1500	0.01	1250	1700	43	12	300	0.04	1@5	
		141	S	C	C31025M	30	1500	0.01	1250	1900	31	12	200	0.06	1@5	
		142	S	C	C31025N	30	1500	0.01	1250	1700	30	6	100	0.06	1@5	
10	3/4	101(S-1)	H	I	C70102B	38	1500	0.01	1250	310	2.8	3.3	30	0.11	800@4	
		107(S-11)	H	I	4460	38	1500	0.5	1250	6000	48	7.5	60	0.125	6@7.5	
			H	I	7767	36	1500	0.5	1250	13,000	48	16	60	0.27	4@7.5	
			H	I	C70102E	38	1500	0.5	1250	8800	56	11	70	0.16	1.4@7.5	
		110(S-20)	H	I	8644	34	2100	0.5	1500	6900	64	16	150	0.11	3@30	
			H	I	8645	34	1800	0.1	1500	6900	64	16	150	0.11	3@30	
		114	H	I	C70042D	34	2100	0.5	1500	4300	60	10	140	0.071	6@30	
		115	H	I	4516	36	1800	0.5	1500	56,000	71	47	60	0.8	0.2@7	
			H	I	C70102M	38	1800	0.5	1500	32,000	79	27	67	0.4	0.2@7	
		124	H	I	C70102N	38	1500	0.5	1250	4800	72	6	90	0.067	2@7.5	
		131	H	I	C70042K	34	2100	0.5	1500	3600	45	20	250	0.08	6@30	
		132	H	I	C70042R	34	2100	0.5	1500	5500	44	25	200	0.125	2@30	
		139	H	I	C70042S	38	1800	0.5	1500	15,000	60	20	80	0.25	1@10	
	1	115	H	C	C31016F	40	1500	0.02	1250	36,000	79	30	67	0.45	0.5@7	
		139	H	C	C31016G	40	1800	0.02	1500	12,000	60	17	80	0.2	0.5@20	
	1-1/2	101(S-1)	H	C	7102	42	1500	0.01	1250	660	2.8	7	30	0.23	1900@4	
		107(S-11)	H	C	2060	42	1250	0.75	1000	36,000	36	45	45	1	4.5@20	
			H	C	2067	44	1250	0.75	1000	16,200	60	20	74	0.27	2.6@20	
			H	C	4438	44	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
			H	C	4439	44	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
			H	C	4440	44	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
			H	C	4441	46	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
			H	C	4441A	46	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
			H	C	4461	46	1500	1.0	1250	8000	48	10	60	0.17	5@10	
			H	C	6199	42	1250	0.75	1000	36,000	36	45	45	1	4.5@20	
			H	C	C7151N	48	1600	0.5	1500	57,000	70	70	85	0.82	0.8@20	
			H	C	C70132B	48	1600	0.5	1500	57,000	70	70	85	0.82	0.8@20	
		110(S-20)	H	C	C70114C	46	1800	1.0	1500	10,800	77	25	180	0.14	4@10	
		111	DW	C	4526	32	2000	0.1	1250	4400	89	15	300	0.05	2@20	
		115	H	C	4517	42	1800	0.5	1500	56,000	79	47	67	0.7	0.2@7	
			H	C	C7151Q	48	1800	0.5	1500	39,000	79	33	67	0.49	0.3@7	
			H	C	C70114F	46	1800	0.5	1500	39,000	79	33	67	0.49	0.3@7	
			H	C	C70132A	48	1800	0.5	1500	65,000	79	55	67	0.82	0.4@6.7	
		117	H	C	C70114J	46	1800	0.5	1500	39,000	79	33	67	0.49	0.3@7	
		127	H	C	C7151U	44	1250	0.75	1000	8200	25	20	60	0.33	10@40	

* A maximum supply-voltage value within the specified range is supplied with each C31024.

* The values 0.9 and 9 are the ratios of the anode current by the light flux value that is incident on a Corning C.S. No. 5-58 filter (1/2 stock thickness). The filter is interposed between a 2870° K light source and the tube.

^a See bar graphs on pages 83 and 84 and spectral-response characteristic curves on page 85.

^b Viewing configuration: H, head-on; S, side-on; and DW, dormer-window.

^c Cage structures: C, circular-cage; I, in-line; and V, venetian-blind.

Number of Stages	Nominal Tube Diameter Inches	Spectral Response ^a	Viewing Configuration ^b	Cage Structure ^c	RCA Type No.	Page No.	Maximum Ratings		Typical Characteristics at the Specified Supply Voltage and 22° C							
							Supply Voltage (E) V	Average Anode Current mA	Supply Voltage V	Sensitivity				Current Amplification (Approx.) x 10 ⁶	Anode Dark Current n/A @ Anode Luminous Sensitivity A/lm	
										Radiant		Luminous				
										Anode A/W	Cathode mA/W	Anode A/lm	Cathode uA/lm			
10 (Cont'd)	1-1/2 (Cont'd)	132	H	C	C7151W	42	1500	0.5	1250	10,000	40	50	200	0.25	1@20	
		137	H	C	C7151Y	44	1500	0.5	1250	2400	40	12	200	0.06	3@10	
	2	138	H	C	C7151Z	44	1500	0.5	1250	30,000	73	70	170	0.41	10@40	
		139	H	C	C7151AA	42	1800	0.5	1500	19,000	60	25	80	0.31	0.4@10	
		106(S-10)	H	C	6217	52	1250	0.75	1000	50,000	20	100	40	2.5	28@20	
		107(S-11)	H	C	2020	52	1500	2.0	1250	4800	40	6	50	0.12	4@20	
			H	C	2061	50	1500	2.0	1250	—	64	—	80	—	—	
			H	V	2063	62	2000	2.0	1500	—	56	—	70	—	—	
			H	C	5819	52	1250	0.75	1000	80,000	40	100	50	2	6@20	
			H	C	6342A	50	1500	2.0	1250	25,000	64	31	80	0.39	4@20	
			H	C	6655A	52	1250	0.75	1000	96,000	61	120	76	1.6	6@20	
			H	I	7746	54	2500	2.0	2000	960,000	56	1200	70	17	250@230	
			H	V	8053	62	2000	2.0	1500	34,000	56	42	70	0.6	4@9	
		108(S-13)	H	C	6903	52	1250	0.75	1000	72,000	48	90	60	1.5	10@20	
		110(S-20)	H	V	4463	62	2500	1.0	2000	11,000	68	25	160	0.16	4.8@12	
			H	I	7326	54	2400	1.0	1800	37,500	64	88	150	0.59	3@20	
		115	H	C	4518	50	2000	0.5	1500	39,000	79	33	67	0.49	0.24@7	
			H	V	4523	62	2500	0.5	1500	32,000	71	27	60	0.45	0.5@13	
		120	H	V	8664	62	2000	2.0	1500	18,000	69	17	67	0.25	1@7.5	
			H	V	8664/V1	62	2000	2.0	1500	18,000	69	17	67	0.25	1@7.5	
	132	H	C	C7164R	50	1500	0.5	1250	20,000	40	100	200	0.5	30@150		
		H	C	C7164S	50	1500	0.5	1250	20,000	40	100	200	0.5	30@150		
	3	107(S-11)	H	V	2064B	64	2000	2.0	1500	—	64	—	80	—	—	
			H	V	8054	64	2000	2.0	1500	35,000	64	43	80	0.54	4@9	
		110(S-20)	H	V	4464	64	2500	1.0	2000	11,000	68	25	160	0.16	4.8@12	
		115	H	V	4524	64	2500	0.5	1500	32,000	71	27	60	0.45	1@13	
		120	H	V	C31009	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
			H	V	C31009A	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
			H	V	C31009B	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
			H	V	C31009C	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
			H	V	C31012	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
			H	V	C31012A	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
			H	V	C31012B	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
			H	V	C31012C	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5	
		122	H	V	4521	64	2000	0.5	1500	19,000	87	18	83	0.22	2@7.5	
		5	107(S-11)	H	V	2065	68	2000	2.0	1500	—	88	—	110	—	—
			H	V	8055	68	2000	2.0	1500	35,000	88	44	110	0.4	4@9	
	110(S-20)		H	V	4465	68	2500	1.0	2000	11,000	68	25	160	0.16	4.8@12	
	115		H	V	4525	68	2500	0.5	1500	32,000	80	27	67	0.4	1.5@13	
			H	V	C31027	70	2000	0.5	1500	13,000	88	11.5	77	0.15	2@0.9*	
11	2	128	H	I	C31034	56	2000	0.01	1500	41,000	68	300	500	0.6	3@100	
			H	I	C31034A	56	2000	0.01	1500	62,000	155	400	1000	0.4	3@100	
		140	H	I	C31034B	56	2000	0.01	1500	14,000	57	100	400	0.25	10@100	
		141	H	I	C31034C	56	2000	0.01	1500	16,000	47	100	300	0.33	10@100	
	3/4	142	H	I	C31034D	56	2000	0.01	1500	17,000	42	60	150	0.4	10@50	
107(S-11)		H	I	4802	36	2000	0.5	1500	160,000	60	200	75	2.7	200@200		
121		H	I	C31005	36	2500	0.5	2100	9200 min. @ 253.7 nm	9.2 min. @ 253.7 nm	—	—	1 min.	0.1@ 3000A/W		
125		H	I	C70128	36	1800	0.5	1500	3000 @ 253.7 nm	15 @ 253.7 nm	—	—	0.2	0.5@ 3000A/W		
12	3/4	131	H	I	C31026	40	2200	0.5	1800	26,000	43	150	250	0.6	40@50	
		101(S-1)	H	I	C70007A	54	2000	0.01	1250	940	2.8	10	30	0.33	400@4	
		107(S-11)	H	I	7850	54	2600	2.0	1800	510,000	56	640	70	9.1	64@160	
		113	H	I	C31000A	60	3000	1.0	2000	270,000	77	700	200	3.5	5@200	
			H	I	C31000B	60	3000	1.0	2000	270,000	77	700	200	3.5	5@200	
		116	H	I	4507	60	2500	0.2	1500	180,000	97	160	85	1.9	0.2@50	
			H	I	8575	60	3000	0.2	2000	970,000	97	850	85	10	1@200	
			H	I	8850	58	3000	0.2	2000	710,000	97	620	85	7.3	0.6@200	
			H	I	8851	58	3000	0.2	2000	710,000	97	620	85	7.3	0.6@200	
		118	H	I	C31000N	58	3000	0.2	2000	710,000	97	620	85	7.3	0.6@200	
	5		H	I	C31000Z	60	3000	0.2	2000	970,000	97	850	85	10	1@200	
		119	H	I	8852	58	2500	1.0	1500	16,000	37	100	230	0.43	10@100	
			H	I	8853	58	2500	1.0	1500	16,000	37	100	230	0.43	10@100	
		133	H	I	C31000M	58	3000	0.2	2000	710,000	97	620	85	7.3	0.6@200	
			H	I	C31000AH	60	3000	0.2	2000	970,000	97	850	85	10	1@200	
		139	H	I	C31000AJ	60	2500	0.2	2000	64,000	60	85	80	1.2	3@50	
		115	H	V	C31029	70	2500	0.5	1750	130,000	88	115	77	1.5	20@9*	
		2	107(S-11)	H	I	6810A	54	2400	2.0	2000	3,000,000	56	3800	70	54	1000@2000
			110(S-20)	H	I	7265	54	3000	1.0	2400	3,100,000	64	7200	150	48	50@1000
		3	112	S	I	C70045C	32	6000	1.0	5000	—	60	—	140	5	500@1000
117	S		I	C70045D	32	6000	1.0	5000	—	72	—	—	10	1000@10,000		
5	118	H	I	4522	68	3000	0.5	2000	2,600,000	88	2300	77	30	60@2000		
		H	I	8854	68	3000	0.5	2000	3,500,000	88	3100	77	40	60@2000		

RCA Photomultipliers Preliminary Selection Guides

For Photomultipliers by Anode Pulse Rise Time

							Maximum Ratings		Typical Characteristics at the Specified Supply Voltage and 22°C							
Anode Pulse Rise Time at Maximum Supply Voltage ns	Nominal Tube Diameter Inches	Spectral Response ^a	Number of Stages	Viewing Configu- ration ^b	RCA Type No.	Page No.	Supply Voltage (E) V	Average Anode Current mA	Supply Voltage V	Sensitivity				Current Amplifi- cation (Approx.) x 10 ⁶	Anode Dark Current n/A @ Anode Luminous Sensitivity A/lm	
										Radiant		Luminous				
										Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm			
≤ 0.5	3	112	14	S	C70045C	32	6000	1.0	5000	—	60	—	140	5	500@1000	
		117	14	S	C70045D	32	6000	1.0	5000	—	72	—	—	10	1000@10,000	
≤ 1.0 □	2	115	5	H	C31024	58	2750	0.1	3000	430,000	87	360	73	5	—	
≤ 1.5							to 4500									
	1/2	102(S-4)	9	S	8571	24	1250	0.02	1000	73,000	34	75	35	2.1	2@20	
		104(S-5)	9	S	C70129H	24	1250	0.02	1000	44,000	44	35	35	1	20@20	
		123	9	S	C70129G	24	1250	0.02	1000	21,000	31	20	30	0.67	8@15	
	3/4	107(S-11)	6	H	7764	36	1500	0.5	1200	480	48	0.6	60	0.01	2@0.3	
		110(S-20)	10	H	8644	34	2100	0.5	1500	6900	64	16	150	0.11	3@30	
		114	10	H	C70042D	34	2100	0.5	1500	4300	60	10	140	0.071	6@30	
		121	12	H	C31005	36	2500	0.5	2100	9200 min. @ 253.7 nm	9.2 min. @ 253.7 nm	—	—	1 min.	0.1@ 3000A/W	
		131	10	H	C70042K	34	2100	0.5	1500	3600	45	20	250	0.08	6@30	
		132	10	H	C70042R	34	2100	0.5	1500	5500	44	25	200	0.125	2@30	
	1	115	10	H	C31016G	40	1500	0.02	1250	36,000	79	30	67	0.45	0.5@7	
		139	10	H	C31016F	40	1800	0.02	1500	12,000	60	17	80	0.2	0.5@20	
	1-1/8	101(S-1)	9	S	C31004A	26	1500	0.01	1250	235	1.9	2.5	20	0.125	300@2	
		128	9	S	C31025C	30	1500	0.01	1250	2700	61	20	450	0.045	0.3@10	
		129	9	S	C31025B	30	1800	0.01	1250	2000	48	7	170	0.041	0.4@10	
		134	9	S	C31025J	30	1500	0.01	1250	2700	54	20	400	0.05	0.3@10	
		140	9	S	C31025K	30	1500	0.01	1250	1700	43	12	300	0.04	1@5	
		141	9	S	C31025M	30	1500	0.01	1250	1900	31	12	200	0.06	1@5	
		142	9	S	C31025N	30	1500	0.01	1250	1700	30	6	100	0.06	1@5	
≤ 2	3/4	101(S-1)	10	H	C70102B	38	1500	0.01	1250	310	2.8	3.3	30	0.11	800@4	
		107(S-11)	10	H	4460	38	1500	0.5	1250	6000	48	7.5	60	0.125	6@7.5	
			10	H	7767	36	1500	0.5	1250	13,000	48	16	60	0.27	4@7.5	
			10	H	C70102E	38	1500	0.5	1250	8800	56	11	70	0.16	1.4@7.5	
			12	H	4802	36	2000	0.5	1500	160,000	60	200	75	2.7	200@200	
		110(S-20)	10	H	8645	34	1800	0.1	1500	6900	64	16	150	0.11	3@30	
		115	10	H	4516	36	1800	0.5	1500	56,000	71	47	60	0.8	0.2@7	
			10	H	C70102M	38	1800	0.5	1500	32,000	79	27	67	0.4	0.2@7	
		124	10	H	C70102N	38	1500	0.5	1250	4800	72	6	90	0.067	2@7.5	
		139	10	H	C70042S	38	1800	0.5	1500	15,000	60	20	80	0.25	1@10	
		125	12	H	C70128	36	1800	0.5	1500	3000@ 253.7 nm	15@ 253.7 nm	—	—	0.2	0.5@ 3000A/W	
	1	131	12	H	C31026	40	2200	0.5	1800	26,000	43	150	250	0.6	40@50	
1-1/8	102(S-4)	9	S	1P21	26	1250	0.1	1000	120,000	40	120	40	3	1@20		
		9	S	931A	26	1250	1.0	1000	80,000	40	80	40	2	5@20		
		9	S	4471	26	1250	1.0	1000	100,000	40	100	40	2.5	5@20		
		9	S	4472	26	1250	1.0	1000	100,000	40	100	40	2.5	5@20		
		9	S	4473	26	1250	0.1	1000	160,000	40	160	40	4	1@20		
		9	S	6328	26	1250	0.1	1000	35,000	—	35	—	—	—	—	
		9	S	7117	26	1250	0.1	1000	35,000	—	35	—	—	—	—	
		9	S	C7075J	26	1250	0.1	1000	80,000	40	80	40	2	5@20		
	103	9	S	1P28/V 1	28	1250	0.5	1000	160,000	48	200	60	3.3	2@40		
		9	S	1P28A/V 1	28	1250	0.5	1000	160,000	48	200	60	3.3	2@40		
	104(S-5)	9	S	1P28	28	1250	0.5	1000	125,000	50	100	40	2.5	5@20		
		9	S	1P28A	28	1250	0.5	1000	250,000	50	200	40	5	5@20		
	105(S-8)	9	S	1P22	28	1250	1.0	1000	7500	2.3	10	3	3.3	6@0.8		
	109(S-19)	9	S	7200	28	1250	0.5	1000	65,000	65	40	40	1	4@20		
	123	9	S	C31022	28	1250	0.1	1000	160,000	48	200	60	3.3	2@40		
	136	9	S	4552	28	1250	0.5	1000	84,000	54	100	65	1.5	0.8@20		
		9	S	4555	28	1250	0.5	1000	170,000	54	—	—	3	0.8@800V		
1-1/2	110(S-20)	10	H	C70114C	46	1800	1.0	1500	10,800	77	25	180	0.14	4@10		
	111	10	DW	4526	32	2000	0.1	1250	4400	89	15	300	0.05	2@20		
	115	10	H	4517	42	1800	0.5	1500	56,000	79	47	67	0.7	0.2@7		
		10	H	C7151Q	48	1800	0.5	1500	39,000	79	33	67	0.49	0.3@7		
		10	H	C70114F	46	1800	0.5	1500	39,000	79	33	67	0.49	0.3@7		
		10	H	C70132A	48	1800	0.5	1500	65,000	79	55	67	0.82	0.4@6.7		
		117	10	H	C70114J	46	1800	0.5	1500	39,000	79	33	67	0.49	0.3@7	
		139	10	H	C7151AA	42	1800	0.5	1500	19,000	60	25	80	0.31	0.4@10	
2	107(S-11)	10	H	7746	54	2500	2.0	2000	960,000	56	1200	70	17	250@230		
		12	H	7850	54	2600	2.0	1800	510,000	56	640	70	9.1	64@160		

^c Single electron anode pulse rise time at 3500 volts.

^d A maximum supply-voltage value within the specified range is supplied with each C31024.

* The values 0.9 and 9 are the ratios of the anode current by the light flux value that is incident on a Corning C.S. No. 5-58 filter (1/2 stock thickness). The filter is interposed between a 2870° K light source and the tube.

^a See bar graphs on pages 83 and 84 and spectral-response characteristic curves on page 85.

^b Viewing configurations: H, head-on; S, side-on; and DW, dormer window.

							Maximum Ratings		Typical Characteristics at the Specified Supply Voltage and 22°C							
Anode Pulse Rise Time at Maximum Supply Voltage ns	Nominal Tube Diameter Inches	Spectral Response ^a	Number of Stages	Viewing Configu- ration ^b	RCA Type No.	Page No.	Supply Voltage (E) V	Average Anode Current mA	Supply Voltage V	Sensitivity				Current Amplifi- cation (Approx.) x 10 ⁶	Anode Dark Current n/A @ Anode Luminous Sensitivity A/lm	
										Radiant		Luminous				
										Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm			
≤2.5	1-1/2	101(S-1)	10	H	7102	42	1500	0.01	1250	660	2.8	7	30	0.23	1900@4	
		107(S-11)	10	H	2060	42	1250	0.75	1000	36,200	36	45	45	1	4.5@20	
			10	H	2067	44	1250	0.75	1000	16,200	60	20	74	0.27	2.6@20	
			10	H	4438	44	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
			10	H	4439	44	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
			10	H	4440	44	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
			10	H	4441	46	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
			10	H	4441A	46	1250	0.75	1000	21,600	36	27	45	0.6	16@20	
			10	H	4461	46	1500	1.0	1250	8000	48	10	60	0.17	5@10	
			10	H	6199	42	1250	0.75	1000	36,000	36	45	45	1	4.5@20	
			10	H	C7151N	48	1600	0.5	1500	57,000	70	70	85	0.82	0.8@20	
	2		10	H	C70132B	48	1600	0.5	1500	57,000	70	70	85	0.82	0.8@20	
		127	10	H	C7151U	44	1250	0.75	1000	8200	25	20	60	0.33	10@40	
		132	10	H	C7151W	42	1500	0.5	1250	10,000	40	50	200	0.25	1@20	
		137	10	H	C7151Y	44	1500	0.5	1250	2400	40	12	200	0.06	3@20	
		138	10	H	C7151Z	44	1500	0.5	1250	30,000	73	70	170	0.41	10@40	
		101(S-1)	12	H	C70007A	54	2000	0.01	1250	940	2.8	10	30	0.33	400@4	
		110(S-20)	10	H	7326	54	2400	1.0	1800	37,500	64	88	150	0.59	3@20	
		113	12	H	C31000A	60	3000	1.0	2000	270,000	77	700	200	3.5	5@200	
			12	H	C31000B	60	3000	1.0	2000	270,000	77	700	200	3.5	5@200	
		115	10	H	4518	50	2000	0.5	1500	39,000	79	33	67	0.49	0.24@7	
		116	12	H	4507	60	2500	0.2	1500	180,000	97	160	85	1.9	0.2@50	
			12	H	8575	60	3000	0.2	2000	970,000	97	850	85	10	1@200	
			12	H	8850	58	3000	0.2	2000	710,000	97	620	85	7.3	0.6@200	
			12	H	8851	58	3000	0.2	2000	710,000	97	620	85	7.3	0.6@200	
		118	12	H	C31000N	58	3000	0.2	2000	710,000	97	620	85	7.3	0.6@200	
			12	H	C31000Z	60	3000	0.2	2000	970,000	97	850	85	10	1@200	
		119	12	H	8852	58	2500	1.0	1500	16,000	37	100	230	0.43	10@100	
			12	H	8853	58	2500	1.0	1500	16,000	37	100	230	0.43	10@100	
		128	11	H	C31034	56	2000	0.01	1500	41,000	68	300	500	0.6	3@100	
			11	H	C31034A	56	2000	0.01	1500	62,000	155	400	1000	0.4	3@100	
		133	12	H	C31000M	58	3000	0.2	2000	710,000	97	620	85	7.3	0.6@200	
			12	H	C31000AH	60	3000	0.2	2000	970,000	97	850	85	10	1@200	
		139	12	H	C31000AJ	60	2500	0.2	2000	64,000	60	85	80	1.2	3@50	
		140	11	H	C31034B	56	2000	0.01	1500	14,000	57	100	400	0.25	10@100	
		141	11	H	C31034C	56	2000	0.01	1500	16,000	47	100	300	0.33	10@100	
		142	11	H	C31034D	56	2000	0.01	1500	17,000	42	60	150	0.4	10@50	
≤ 3	2	106(S-10)	10	H	6217	52	1250	0.75	1000	50,000	20	100	40	2.5	28@20	
		107(S-11)	10	H	2020	52	1500	2.0	1250	4800	40	6	50	0.12	4@20	
			10	H	2061	50	1500	2.0	1250	—	64	—	80	—	—	
			10	H	5819	52	1250	0.75	1000	80,000	40	100	50	2	6@20	
			10	H	6342A	50	1500	2.0	1250	25,000	64	31	80	0.39	4@20	
			10	H	6655A	52	1250	0.75	1000	96,000	61	120	76	1.6	6@20	
		108(S-13)	10	H	6903	52	1250	0.75	1000	72,000	48	90	60	1.5	10@20	
		100(S-20)	14	H	7265	54	3000	1.0	2400	3,100,000	64	7200	150	48	50@1000	
		132	10	H	C7164R	50	1500	0.5	1250	20,000	40	100	200	0.5	30@150	
			10	H	C7164S	50	1500	0.5	1250	20,000	40	100	200	0.5	30@150	
	5	118	14	H	4522	68	3000	0.5	2000	2,600,000	88	2300	77	30	60@2000	
		14	H	8854	68	3000	0.5	2000	3,500,000	88	3100	77	40	60@2000		
≤ 3.5	2	107(S-11)	14	H	6810A	54	2400	2.0	2000	3,000,000	56	3800	70	54	1000@2000	
		107(S-11)	10	H	2063	62	2000	2.0	1500	—	56	—	70	—	—	
	2		10	H	8053	62	2000	2.0	1500	34,000	56	42	70	0.6	4@9	
		110(S-20)	10	H	4463	62	2500	1.0	2000	11,000	68	25	160	0.16	4.8@12	
		115	10	H	4523	62	2500	0.5	1500	32,000	71	27	60	0.45	0.5@13	
		120	10	H	8664	62	2000	2.0	1500	18,000	69	17	67	0.25	1@7.5	
			10	H	8664/V1	62	2000	2.0	1500	18,000	69	17	67	0.25	1@7.5	
		3	107(S-11)	10	H	2064B	64	2000	2.0	1500	—	64	—	80	—	—
				10	H	8054	64	2000	2.0	1500	35,000	64	43	80	0.54	4@9
			110(S-20)	10	H	4464	64	2500	1.0	2000	11,000	68	25	160	0.16	4.8@12
115	10		H	4524	64	2500	0.5	1500	32,000	71	27	60	0.45	1@13		
120	10		H	C31009	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5		
	10		H	C31009A	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5		
	10	H	C31009B	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5			
	10	H	C31009C	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5			
	10	H	C31012	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5			
	10	H	C31012A	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5			
	10	H	C31012B	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5			
	10	H	C31012C	66	2000	2.0	1500	17,000	77	17	75	0.22	1@7.5			
≤ 15	3	122	10	H	4521	64	2000	0.5	1500	19,000	87	18	83	0.22	2@7.5	
		5	107(S-11)	10	H	2065	68	2000	2.0	1500	—	88	—	110	—	—
				10	H	8055	68	2000	2.0	1500	35,000	88	44	110	0.4	4@9
			110(S-20)	10	H	4465	68	2500	1.0	2000	11,000	68	25	160	0.16	4.8@12
			115	10	H	4525	68	2500	0.5	1500	32,000	80	27	67	0.4	1.5@13
				10	H	C31027	70	2000	0.5	1500	13,000	88	11.5	77	0.15	2@0.9*
				12	H	C31029	70	2500	0.5	1750	130,000	88	115	77	1.5	20@9*

RCA Photomultipliers

Preliminary Selection Guides

For Ruggedized Photomultipliers by Diameter (Size)

Nominal Tube Diameter Inches	Spectral Response ^a	Number of Stages	Viewing Configuration ^b	Cage Structure	RCA Type Number	Military Specification ^d	Quality Conformance Inspection ^e	Environmental Testing ^f		Acceleration	Temperature Cycling
								Shock	Vibration		
1/2	102(S-4)	9	S	C	8571	—	Design	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 g's 5 to 2000Hz 1-1/2 hrs total 6 sweeps per axis	15 g's 5 min per axis	—45 to +75 to —45°C 8 hrs total
	104(S-5)	9	S	C	C70129H	—	Design	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 g's 5 to 2000Hz 1-1/2 hrs total 6 sweeps per axis	15 g's 5 min per axis	—45 to +75 to —45°C 8 hrs total
3/4	101(S-1)	10	H	I	C70102B	MIL-E-5272C	Design	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis	—
	107(S-11)	10	H	I	4460	MIL-E-5272C	100%	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000Hz 15 min total 1 sweep per axis	—	—
							Design	—	20 ± 2 g's 20 to 2000Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis	—
		10	H	I	C70102E	MIL-E-5272C	100% on special order	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000Hz 15 min total 1 sweep per axis	—	—
							Design	—	20 ± 2 g's 20 to 2000Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis	—
	115	10	H	I	C70102M	MIL-E-5272C	100%	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000Hz 15 min total 1 sweep per axis	—	—
	124	10	H	I	C70102N	MIL-E-5272C	100%	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000Hz 15 min total 1 sweep per axis	—	—
							Design	—	20 ± 2 g's 20 to 2000Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis	—
	139	10	H	I	C70042S	MIL-E-5272C	100% on special order	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000Hz 15 min total 1 sweep per axis	—	—
							Design	—	20 ± 2 g's 20 to 2000Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis	—
1	115	10	H	C	C31016F	MIL-STD-810B	Design	75 ± 7 g's 11 ± 1 ms 4 impact shocks per axis	20.7 g's 50 to 2000Hz 1-1/2 hrs total 1 sweep per axis	100 ± 10 g's	—
	139	10	H	C	C31016G	MIL-STD-810B	Design	75 ± 7 g's 11 ± 1 ms 4 impact shocks per axis	20.7 g's 50 to 2000Hz 1-1/2 hrs total 1 sweep per axis	100 ± 10 g's	—

^a See bar graphs on pages 83 and 84 and spectral-response characteristic curves on page 85.

^b Viewing configurations: H, head-on; and S, side-on.

^c Cage structure: C, circular-cage; I, in-line; and V, venetian-blind.

^d A: MIL-E-5272C, 13 April 1959 Amendment 1, 5 January 1960.
B: MIL-STD 810B, 15 June 1967

^e Quality Conformance Inspection: 100%, every tube tested; Sample, some tubes tested from each lot; and Design, initial tubes only have been tested.
Vibration: Cycling ranges from minimum to maximum to minimum; time is total time for vibration in three axes (equal time for each axis).

^f For detailed information on environmental testing, request a technical data sheet on the specific type.

Nominal Tube Diameter Inches	Spectral Response ^a	Number of Stages	Viewing Config- uration ^b	Cage Struc- ture	RCA Type Number	Military Specifi- cation ^d	Quality Confor- mance Inspection ^e	Environmental Testing ^f		Acceleration	Tempera- ture Cycling	
								Shock	Vibration			
1-1/2	107(S-11)	10	H	C	4441	MIL-E-5272C	Design	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis	—	
								30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000Hz 15 min total 1 sweep per axis	—	—	
		10 10	H H	C C	4441A 4461	MIL-E-5272C	100%	—	20 ± 2 g's 20 to 2000Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis	—	
								—	20 ± 2 g's 20 to 2000Hz 15 min total 1 sweep per axis	—	—	
		10 10	H H	C C	C7151N C70132B	MIL-E-5272C	100%	—	20 ± 2 g's 20 to 2000Hz 15 min total 1 sweep per axis	—	—	
								30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis	—	
		110(S-20)	H	C	C70114C	MIL-E-5272C	Design	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis	—	
								30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis	—	
		115	H H H	C C C	C7151Q C70114F C70132A	MIL-E-5272C	Design	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis	—	
								30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis	—	
								30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis	—	
		117	H	C	C70114J	MIL-E-5272C	100% on special order	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000Hz 15 min total 1 sweep per axis	—	—	
							Design	—	20 ± 2 g's 20 to 2000Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis	—	
2	120	10 10	H H	V V	8664 8664/V1	—	Sample	150 ± 15 g's 11 ± 2 ms 6 impact shocks per axis	60 g's 48 to 3000Hz 15 min total 1 sweep per axis	—	—	
								1500 ± 150 g's 0.20 ± 0.05 ms 6 impact shocks per axis	—	—	—	
		10 10	H H	V V	8664 8664/V1		Design	—	60 g's 48 to 3000Hz 6 hrs total 2 sweeps per axis	150 ± 10 g's 2 min per axis	—	
								150 ± 15 g's 11 ± 2 ms 2 impact shocks per axis	60 g's 48 to 3000Hz 6 hrs total 2 sweeps per axis	150 ± 10 g's 2 min per axis	—	
3	120	10 10 10 10 10 10 10	H H H H H H H	V V V V V V V	C31009 C31009A C31009B C31009C C31012 C31012A C31012B C31012C	—	Design	150 ± 15 g's 11 ± 2 ms 2 impact shocks per axis	60 g's 48 to 3000Hz 6 hrs total 2 sweeps per axis	150 ± 10 g's 2 min per axis	—	
								1500 ± 150 g's 0.20 ± 0.05 ms 2 impact shocks per axis	—	—	—	
								150 ± 15 g's 11 ms 1500 g's 0.20 ms	60 g's 48 to 3000Hz —	—	—	
								150 ± 15 g's 11 ms 1500 g's 0.20 ms	60 g's 48 to 3000Hz —	—	—	
								150 ± 15 g's 11 ms 1500 g's 0.20 ms	60 g's 48 to 3000Hz —	—	—	
								150 ± 15 g's 11 ms 1500 g's 0.20 ms	60 g's 48 to 3000Hz —	—	—	
								150 ± 15 g's 11 ms 1500 g's 0.20 ms	60 g's 48 to 3000Hz —	—	—	
		150 ± 15 g's 11 ms 1500 g's 0.20 ms	60 g's 48 to 3000Hz —	—	—							
5	115	10 12	H H	V V	C31027 C31029	—	Design	150 g's 11 ms 1500 g's 0.20 ms	60 g's 48 to 3000Hz —	—	—	
								150 g's 11 ms 1500 g's 0.20 ms	60 g's 48 to 3000Hz —	—	—	

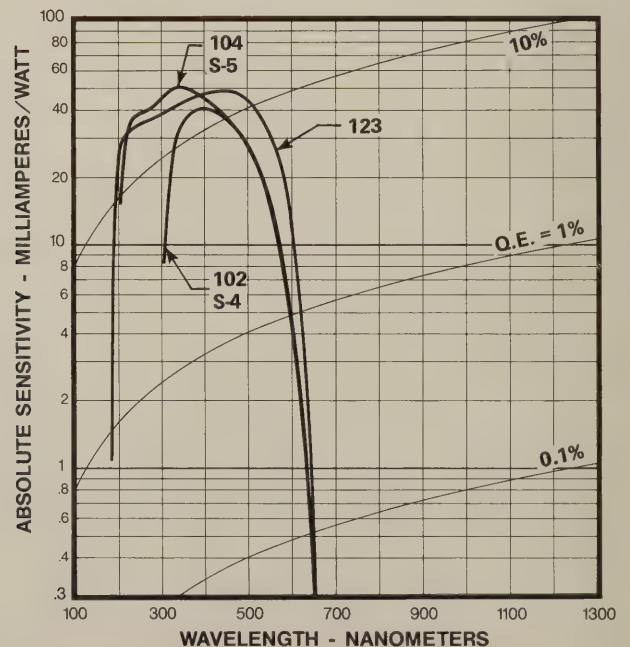
RCA Photomultipliers

1/2"-Diameter Side-On Types Ruggedized and Non-Ruggedized Tubes Electrostatic-Focus, Circular-Cage Dynode Structure

Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C								
				Supply Voltage V	Average Anode Current mA ^b	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns	
							Radiant ^d		Luminous ^e					
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm				
102 (S-4)	8571	9 C	Cs-Sb	1250	0.02	1000 C	73,000	34	75	35	2.1	2 @ 20	≤ 1.5	Parent type. Ruggedized. Designed to withstand shock, vibration, acceleration, and temperature cycling.
104 (S-5)	C70129H [▲]	9 C	Cs-Sb	1250	0.02	1000 C	44,000	44	35	35	1	20 @ 20	≤ 1.5	Variant of 8571 having UV-transmitting glass window.
123	C70129G [▲]	9 C	Cs-Sb	1250	0.02	1000 C	21,000	31	20	30	0.67	8 @ 15	≤ 1.5	Non-ruggedized variant of 8571 having metal envelope and UV-grade sapphire window providing extended UV-response.

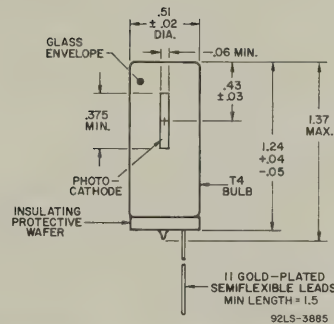
▲ Objective Data

- ^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.
- ^b Averaged over any interval of 30 seconds maximum.
- ^c For voltage distribution, see page 9.
- ^d At wavelength of maximum response of the spectral response characteristic.
- ^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.
- ^f At the maximum rated supply voltage. The photocathode is fully illuminated.
- ^g See Glossary of Terms, pages 4 and 5.
- The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.

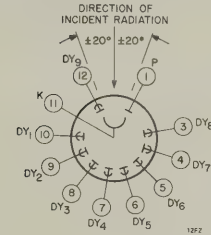


Typical Photocathode Spectral Response Characteristics ■

8571



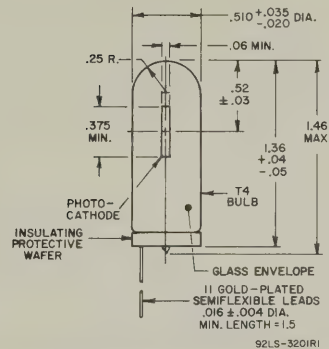
Basing (Bottom View)



Socket**
Not required. Type has semiflexible leads

Magnetic Shield**
P - 07P13V1

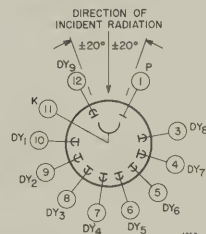
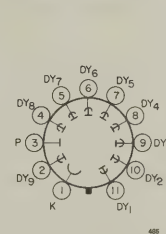
C70129H*



Basing (Bottom View)

With temporary base attached

With temporary base removed

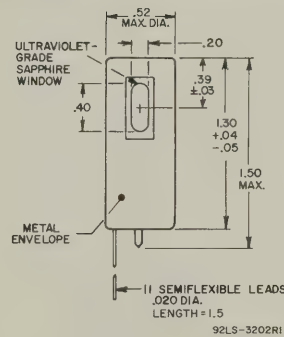


Socket**
AM - 78S11T

Magnetic Shield**
P - 07P13V1

* Type is supplied with a modified B11-88 base attached to semiflexible leads.

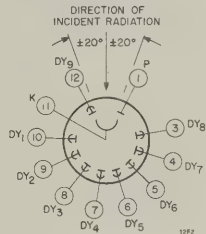
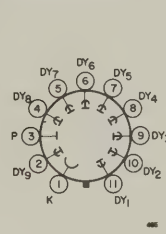
C70129G*



Basing (Bottom View)

With temporary base attached

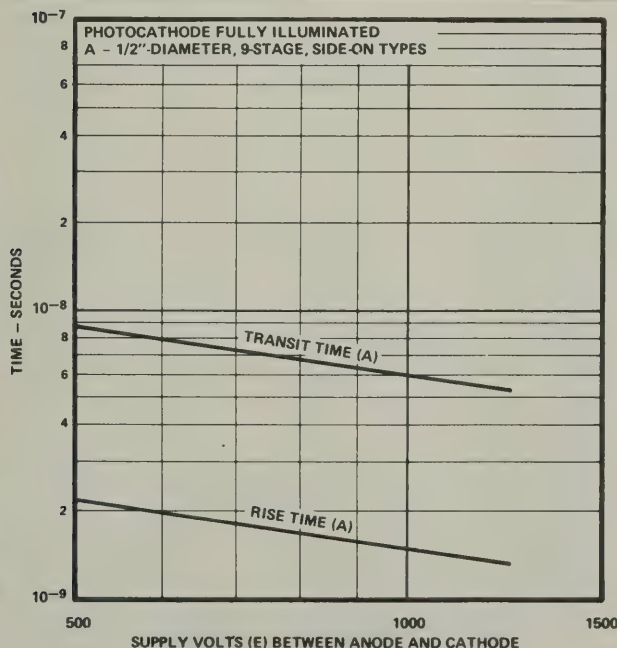
With temporary base removed



Socket**
AM - 78S11T

Magnetic Shield**
P - 07P13V1

* Type is supplied with a modified B11-88 base attached to semiflexible leads.



Environmental Testing

RCA Type No.	Military Specifica- tion ^a	Quality Conform- ance Inspection ^b	Tests			
			Shock	Vibration	Acceler- ation	Temperature Cycling
8571 C70129H	—	Design	30±3 g's 11±1 ms 6 impact shocks per axis	20 g's 5 to 2000 Hz 1-1/2 hrs total 6 sweeps per axis	15 g's 5 min per axis	-45 to +75 to -45° C 8 hrs total

a None

b Quality Conformance Inspection for ruggedized types:
100% — each tube tested
Sample — some tubes tested
Design — initial production tubes only tested

Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

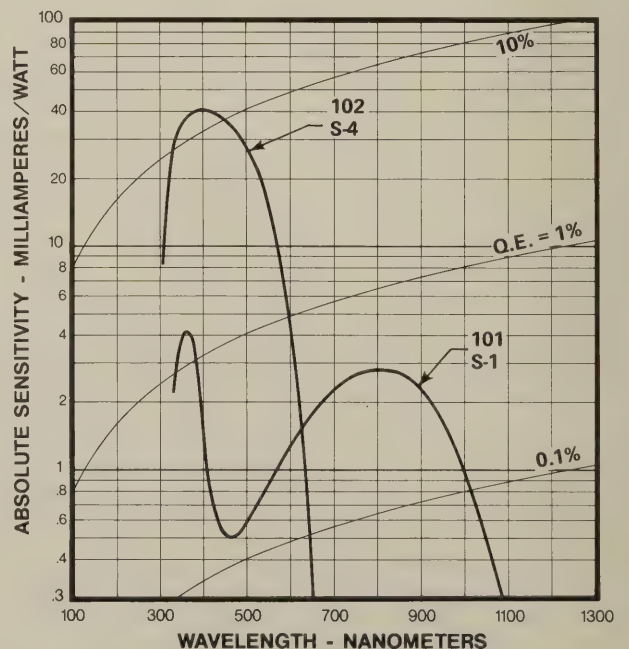
Typical Time Response Characteristics for 1/2" Diameter 9-Stage Photomultipliers

RCA Photomultipliers

1-1/8"-Diameter Side-On Types Electrostatic-Focus, Circular-Cage Dynode Structure

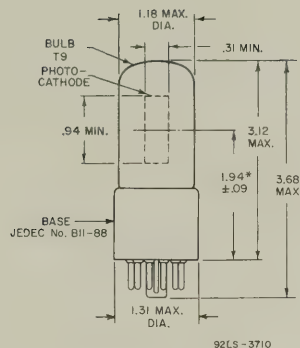
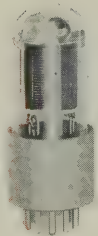
Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g	
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C									
				Supply Voltage V	Average ^b Anode Current mA	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns		
							Radiant ^d		Luminous ^e						
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μ A/lm					
102 (S-4)	931A	9 C	Cs-Sb	1250	1.0	1000 C	80,000	40	80	40	2	5 @ 20	≤ 2	Parent type. Popular, low-cost, general-purpose tube.	
102 (S-4)	4471	9 C	Cs-Sb	1250	1.0	1000 C	100,000	40	100	40	2.5	5 @ 20	≤ 2	Variant of 931A having guaranteed red-to-white ratio of 5% minimum.	
102 (S-4)	4472	9 C	Cs-Sb	1250	1.0	1000 C	100,000	40	100	40	2.5	5 @ 20	≤ 2	Variant of 931A having guaranteed red-to-white ratio of 7% minimum.	
102 (S-4)	C7075J	9 C	Cs-Sb	1250	0.1	1000 C	80,000	40	80	40	2	5 @ 20	≤ 2	Variant of 931A having "anti-hysteresis" design.	
102 (S-4)	1P21	9 C	Cs-Sb	1250	0.1	1000 C	120,000	40	120	40	3	1 @ 20	≤ 2	Premium type combining high photosensitivity and low dark current.	
102 (S-4)	4473	9 C	Cs-Sb	1250	0.1	1000 C	160,000	40	160	40	4	1 @ 20	≤ 2	Variant of 1P21 having higher anode sensitivity and guaranteed red-to-white ratio of 7% minimum.	
102 (S-4)	6328	9 C	Cs-Sb	1250 Peak AC or DC	0.1	1000 C	35,000	—	35	—	—	—	≤ 2	Variant of 931A having shorter overall length. Designed for AC operation.	
102 (S-4)	7117	9 C	Cs-Sb	1250	0.1	1000 C	35,000	—	35	—	—	—	≤ 2	Variant of 931A having shorter overall length.	
101 (S-1)	C31004A	9 C	Be-O	1500	0.01	1250 C	235	1.9	2.5	20	0.125	300 @ 2	≤ 1.5	Variant of 931A designed specifically for near IR systems.	

- ^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.
- ^b Averaged over any interval of 30 seconds maximum.
- ^c For voltage distribution, see page 9.
- ^d At wavelength of maximum response of the spectral response characteristic.
- ^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.
- ^f At the maximum rated supply voltage. The photocathode is fully illuminated.
- ⁹ See Glossary of Terms, pages 4 and 5.
- The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.



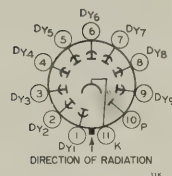
Typical Photocathode Spectral Response Characteristics[■]

931A
4471
4472
C7075J
1P21
4473
C31004A



* This dimension for type C7075J is $1.99'' \pm .09''$.

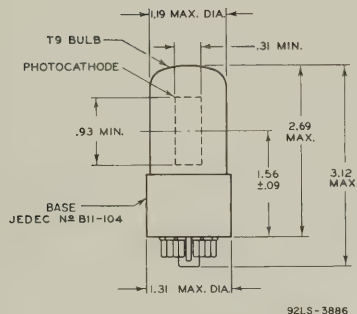
Basing (Bottom View)



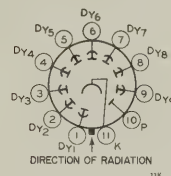
Socket**
AM - 78S11T

Magnetic Shield**
J - S-1562
M - 80801B
P - 13P32V1

6328
7117

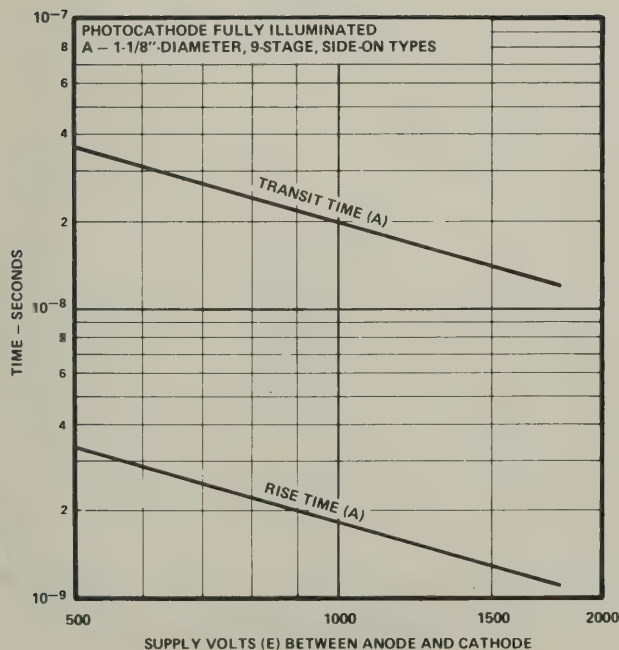


Basing (Bottom View)



Socket**
AM - 78S11T

Magnetic Shield**
M - 80801G
P - 13P28V1



Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see 11.

Typical Time Response Characteristics for 1-1/8" Diameter, 9 Stage Photomultipliers

RCA Photomultipliers

1-1/8"-Diameter Side-On Types (cont'd) Electrostatic-Focus, Circular-Cage Dynode Structure

Mechanical				Electrical											
Spectral Response	RCA Type No.	No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings			Typical Characteristics at specified operating supply voltage, voltage distribution, and 22° C								Remarks ^g
				Supply Voltage V	Average Anode Current mA ^b	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns		
							Radiant ^d		Luminous ^e						
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm					
104 (S-5)	1P28	9 C	Cs-Sb	1250	0.5	1000 C	125,000	50	100	40	2.5	5 @ 20	≤ 2	Variant of 931A having a UV-transmitting glass window.	
103	1P28/V1	9 C	Cs-Sb	1250	0.5	1000 C	160,000	48	200	60	3.3	2 @ 40	≤ 2	Variant of 1P28 having "anti-hysteresis" design.	
104 (S-5)	1P28A	9 C	Cs-Sb	1250	0.5	1000 C	250,000	50	200	40	5	5 @ 20	≤ 2	Variant of 1P28 having a guaranteed red-to-white ratio of 7% minimum.	
103	1P28A/V1	9 C	Cs-Sb	1250	0.5	1000 C	160,000	48	200	60	3.3	2 @ 40	≤ 2	Variant of 1P28A having "anti-hysteresis" design.	
105 (S-8)	1P22	9 C	Cs-Sb	1250	1.0	1000 C	7500	2.3	10	3	3.3	6 @ 0.8	≤ 2	Variant of 931A having S-8 response. When used with Wratten No. 102 and No. 4 filters has spectral response approximating that of eye.	
109 (S-19)	7200	9 C	Cs-Sb	1250	0.5	1000 C	65,000	65	40	40	1	4 @ 20	≤ 2	Variant of 931A having fused-silica window providing extended UV-response.	
123	C31022	9 C	Cs-Sb	1250	0.1	1000 C	160,000	48	200	60	3.3	2 @ 40	≤ 2	Metal envelope type having a UV-grade sapphire window for extended UV response. Has "anti-hysteresis" design.	
136	4552	9 C	Cs-Sb	1250	0.5	1000 C	84,000	54	100	65	1.5	0.8 @ 20	≤ 2	Type has a bialkali photocathode and stiff lead duodecad base.	
136	4555	9 C	Cs-Sb	1250	0.5	1000 C	170,000	54	—	4.5 ^h	3	0.8 @ 800 V	≤ 2	Variant of 4552 designed specifically for flying-spot scanning using blue light sources.	

^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.

^b Averaged over any interval of 30 seconds maximum.

^c For voltage distribution, see page 9.

^d At wavelength of maximum response of the spectral response characteristic.

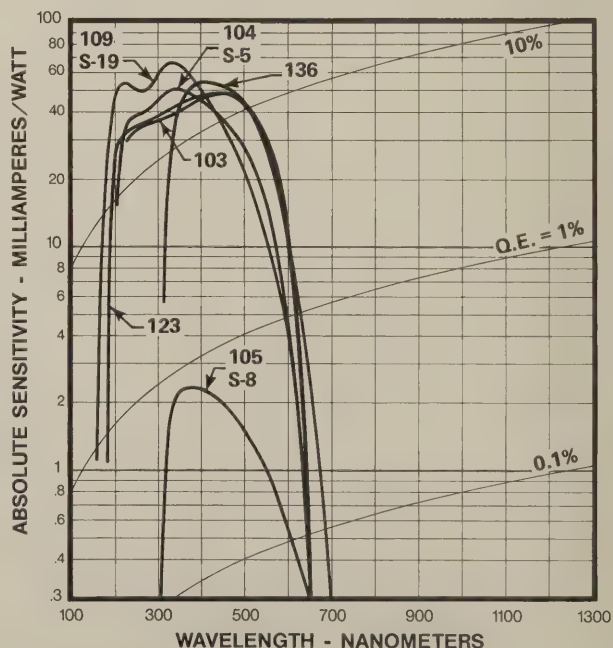
^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.

^f At the maximum rated supply voltage. The photocathode is fully illuminated.

^g See Glossary of Terms, pages 4 and 5.

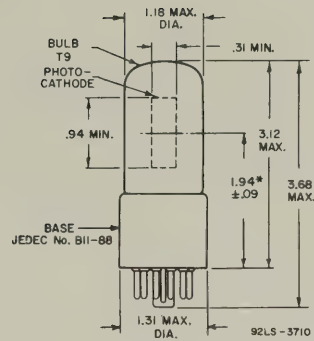
^h The sensitivity shown is in μA per lumen incident on a blue filter combination (JENA UG-5 and JENA BG-12) from a tungsten-filament lamp operated at a color temperature of 2870°K. This source approximates the spectral distribution of a P16 phosphor.

■ The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.



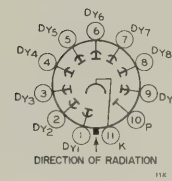
Typical Photocathode Spectral Response Characteristics[■]

1P28
1P28/V1
1P28A
1P28A/V1
1P22



* This dimension for types 1P28/V1 and 1P28A/V1 is 1.99" ±.09".

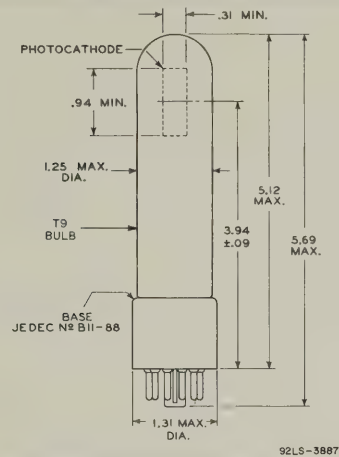
Basing (Bottom View)



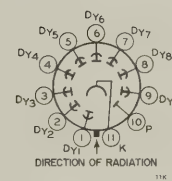
Socket**
AM - 78S11T

Magnetic Shield**
J - S-1562
M - 80801B
P - 13P32V1

7200



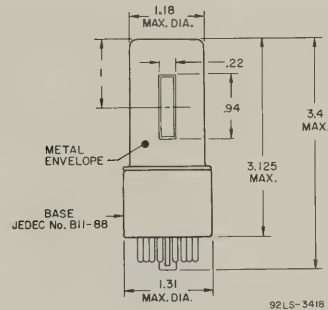
Basing (Bottom View)



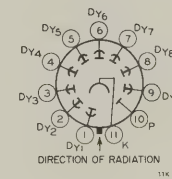
Socket**
AM - 78S11T

Magnetic Shield**
M - 80801L
P - 13P52V1

C31022



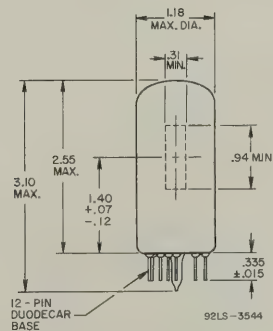
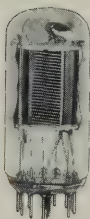
Basing (Bottom View)



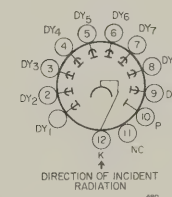
Socket**
AM - 78S11T

Magnetic Shield**
P - Foil or Tape

4552
4555



Basing (Bottom View)



Socket**
C - 12CS-M

Magnetic Shield**
P - Foil or Tape

Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

RCA Photomultipliers

1-1/8"-Diameter QUANTACON Side-On Types Ga-As, Ga-As-P, and Ga-In-As Photocathodes Electrostatic-Focus, Circular-Cage Dynode Structure

Spectral Response	RCA Type No.	Mechanical		Maximum Ratings		Electrical										Remarks ⁹
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Supply Voltage V	Average ^b Anode Current mA	Operating Supply Volts and Distribution ^c	Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C									
							Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns			
							Radiant ^d		Luminous ^e							
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm						
128	C31025C	9 C	Be-O	1500	0.01	1250 C	2700	61	20	450	0.045	0.3 @ 10	≤ 1.5	Ga-As photocathode, UV-transmitting-glass window type. Has essentially "flat" sensitivity throughout its spectral range of 200 to 930 nanometers.		
129	C31025B	9 C	Be-O	1800	0.01	1250 C	2000	48	7	170	0.041	0.4 @ 10	≤ 1.5	Ga-As-P photocathode, UV-transmitting-glass window type. Has high sensitivity throughout its spectral range of 200 to 800 nanometers.		
134	C31025J▲	9 C	Be-O	1500	0.01	1250 C	2700	54	20	400	0.05	0.3 @ 10	≤ 1.5	Variant of C31025C having a ceramic envelope and a UV-grade sapphire window. Has a spectral response range of 150 to 930 nanometers.		
140	C31025K▲	9 C	Be-O	1500	0.01	1250 C	1700	43	12	300	0.04	1 @ 5	≤ 1.5	Variant of C31025C having a Ga-In-As Type I photocathode and a UV-transmitting glass window. Has a spectral response range extending from 200 to 980 nanometers.		
141	C31025M▲	9 C	Be-O	1500	0.01	1250 C	1900	31	12	200	0.06	1 @ 5	≤ 1.5	Variant of C31025K having a Ga-In-As Type II photocathode. Has a spectral response range from about 200 to 1030 nanometers.		
142	C31025N▲	9 C	Be-O	1500	0.01	1250 C	1700	30	6	100	0.06	1 @ 5	≤ 1.5	Variant of C31025K having a Ga-In-As Type III photocathode. Has a spectral range extending from about 200 to 1100 nanometers.		

▲ Objective Data

- ^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.
- ^b Averaged over any interval of 30 seconds maximum.
- ^c For voltage distribution, see page 9.
- ^d At wavelength of maximum response of the spectral response characteristic.
- ^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.
- ^f At the maximum rated supply voltage. The photocathode is fully illuminated.
- ⁹ See Glossary of Terms, pages 4 and 5.

RCA Photomultipliers

1-1/2" and 3"-Diameter Special Side-On Types Electrostatic-Focus, Circular-Cage and In-Line Dynode Structures

		Mechanical		Electrical											
				Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C									
Spectral Response	RCA Type No.	No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Supply Voltage V	Average ^b Anode Current mA	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns	Remarks ^g	
							Radiant ^d		Luminous ^e						
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm					
111	4526	10 C	Be-O	2000	0.1	1250 D	4400	89	15	300	0.05	2 @ 20	≤ 2	Dormer-window type having a multialkali photocathode deposited on a reflective substrate. Excellent for applications where background illumination is relatively high.	
112	C70045C	14 I	Be-O	6000	1.0	5000 Y	—	60	—	140	5	500 @ 1000	≤ 0.5	Has extremely fast rise time capability in conjunction with high gain. Multialkali photocathode and UV transmitting glass window.	
117	C70045D	14 I	Be-O	6000	1.0	5000 Y	—	72	—	—	10	1000 @ 10,000	≤ 0.5	Variant of C70045C having a bialkali photocathode.	

^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.

^b Averaged over any interval of 30 seconds maximum.

^c For voltage distribution, see page 9.

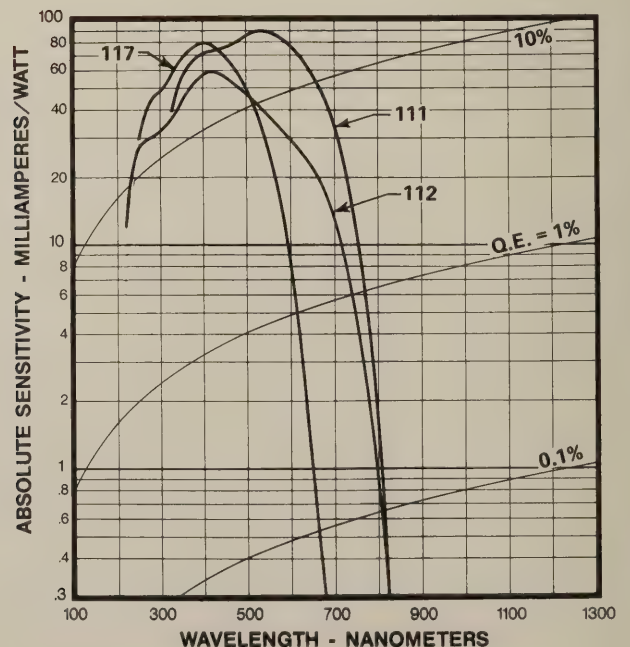
^d At wavelength of maximum response of the spectral response characteristic.

^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.

^f At the maximum rated supply voltage. The photocathode is fully illuminated.

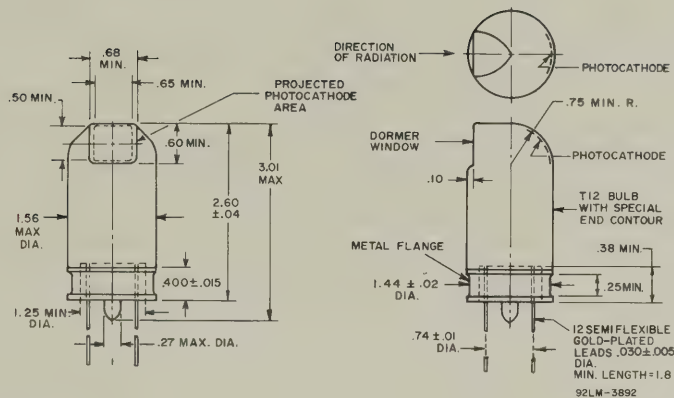
^g See Glossary of Terms, pages 4 and 5.

■ The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.



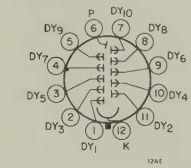
Typical Photocathode Spectral Response Characteristics[■]

4526*



* Type is supplied with a B12-43 base attached to semiflexible leads.

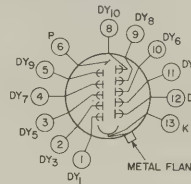
Basing (Bottom View)
With temporary
base attached



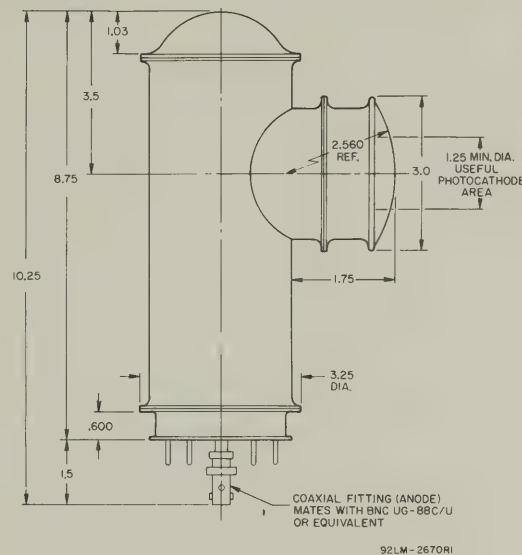
Socket**
C - 3M12
E - 9058

Magnetic Shield**
M - 80802M
P - 17P33V1

With temporary
base removed



C70045C
C70045D

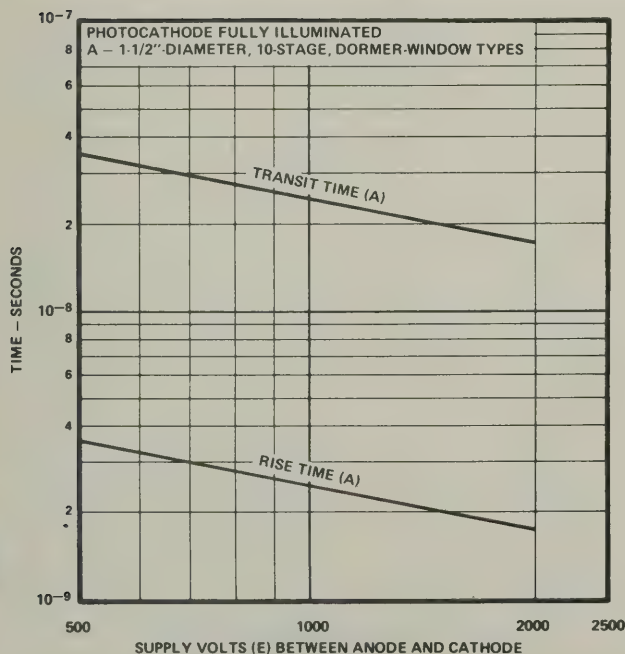


Basing

See technical bulletin

Socket**
AL - 435SBA

Magnetic Shield**
P - Foil or Tape



Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

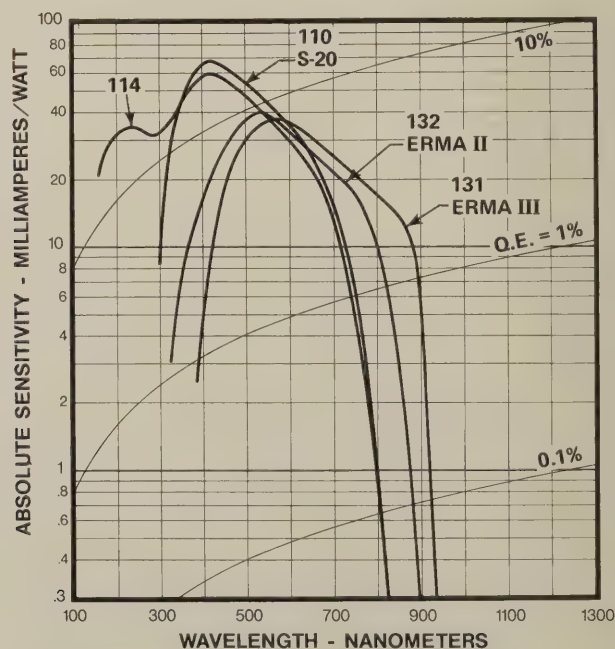
RCA Photomultipliers

3/4" -Diameter Head-On Types Electrostatic-Focus, In-Line Dynode Structure

Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C								
				Supply Voltage V	Average Anode Current mA ^b	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns	
							Radiant ^d		Luminous ^e					
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm				
110 (S-20)	8644	10 I	Be-O	2100	0.5	1500 F	6900	64	16	150	0.11	3 @ 30	≤ 1.5	Parent type. Has multialkali photocathode providing response to about 800 nanometers. Intended for red and near IR applications.
110 (S-20)	8645	10 I	Be-O	1800	0.1	1500 F	6900	64	16	150	0.11	3 @ 30	≤ 2	Type 8644 with integral voltage-divider network encapsulated in magnetic shield.
114	C70042D	10 I	Be-O	2100	0.5	1500 E	4300	60	10	140	0.071	6 @ 30	≤ 1.5	Multialkali photocathode type having fused-silica window for extended UV response.
131	C70042K▲	10 I	Be-O	2100	0.5	1500 E	3600	45	20	250	0.08	6 @ 30	≤ 1.5	Variant of 8644 having an ERMA III photocathode providing response to about 930 nanometers.
132	C70042R▲	10 I	Be-O	2100	0.5	1500 E	5500	44	25	200	0.125	2 @ 30	≤ 1.5	Variant of 8644 having an ERMA II photocathode providing response to about 880 nanometers.

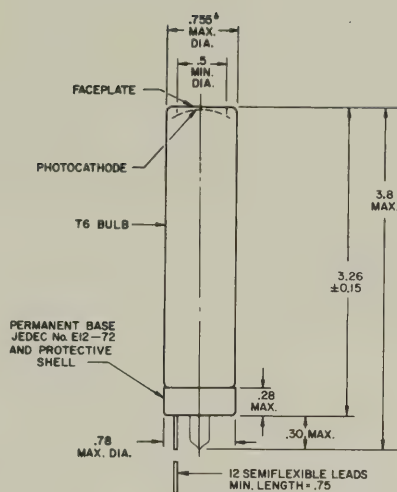
▲ Objective Data

- a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.
- b Averaged over any interval of 30 seconds maximum.
- c For voltage distribution, see page 9.
- d At wavelength of maximum response of the spectral response characteristic.
- e With a tungsten-filament lamp operated at a color temperature of 2870° K. Future data for RCA photomultipliers will be measured using a color temperature of 2854° K.
- f At the maximum rated supply voltage. The photocathode is fully illuminated.
- g See Glossary of Terms, pages 4 and 5.
- The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.



Typical Photocathode Spectral Response Characteristics■

8644*
C70042D*
C70042K*
C70042R*

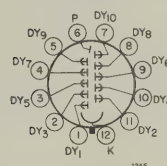


* Types are supplied with a B12-43 attached to semiflexible leads.

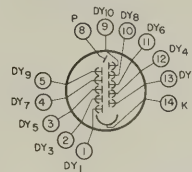
☛ This dimension for type C70042D is 0.81" max.

92LS-3984

Basing (Bottom View)
 With temporary base attached



With temporary base removed



464

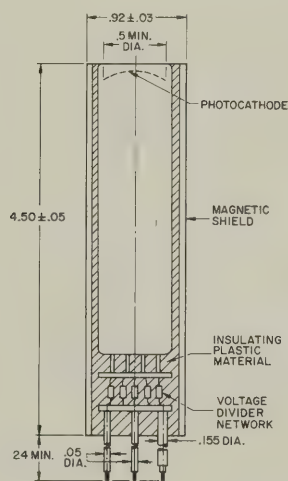
Socket**

AM - 59-402
 AL - 212FTSC
 C - 3M12
 E - 9058

Magnetic Shield**

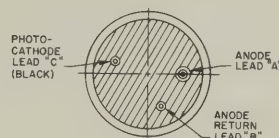
M - 80801N
 P - 10P40

8645



92LS-3047RI

Basing (Bottom View)



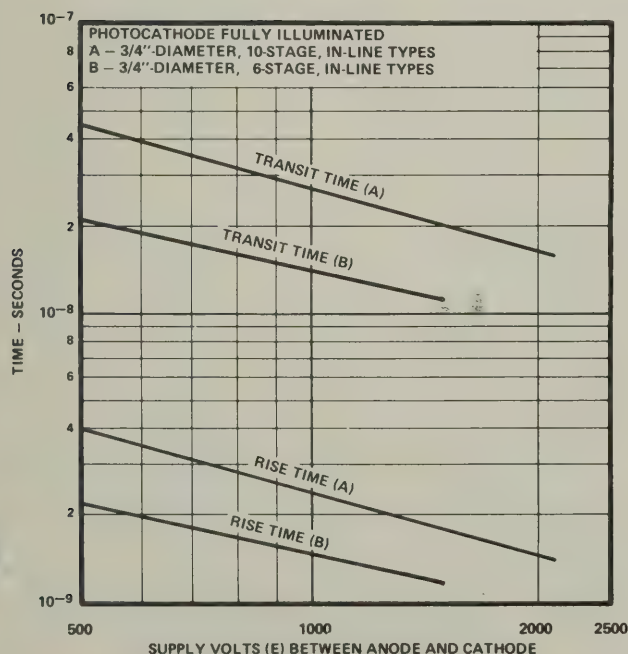
502

Socket**

Not required. Type has semiflexible leads.

Magnetic Shield**

Integral with tube and connected to photocathode.



Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

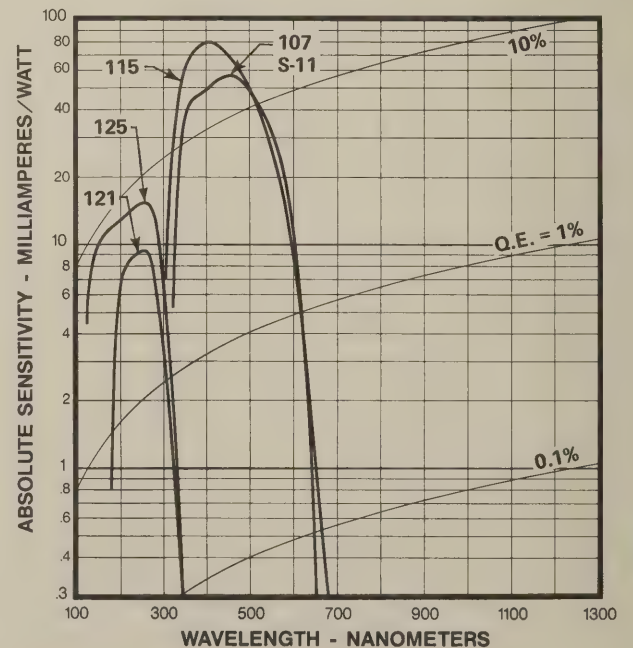
Typical Time Response Characteristics for 3/4" Diameter 6- and 10- Stage Photomultipliers

RCA Photomultipliers

3/4" -Diameter Head-On Types (cont'd) Electrostatic-Focus, In-Line Dynode Structure

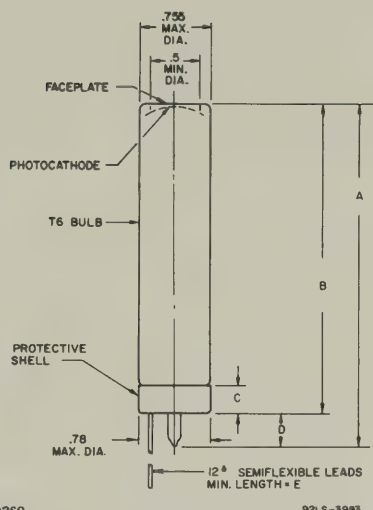
Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C								
				Supply Voltage V	Average ^b Anode Current mA	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns	
							Radiant ^d		Luminous ^e					
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm				
107 (S-11)	7767	10 I	Be-O	1500	0.5	1250 E	13,000	48	16	60	0.27	4 @ 7.5	≤ 2	Parent type. Designed primarily for compact scintillation counting systems and general applications.
107 (S-11)	7764	6 I	Be-O	1500	0.5	1200 B	480	48	0.6	60	0.01	2 @ 0.3	≤ 1.5	Variant of 7767 having 6 stages and stiff-lead stem.
107 (S-11)	4802	12 I	Be-O	2000	0.5	1500 M	160,000	60	200	75	2.7	200 @ 200	≤ 2	12-stage variant of 7767 having higher gain capability.
115	4516	10 I	Be-O	1800	0.5	1500 E	56,000	71	47	60	0.8	0.2 @ 7	≤ 2	Variant of 7767 having alkali photocathode.
121	C31005	12 I	Be-O	2500	0.5	2100 N	9200 min. @ 253.7 nm	9.2 min. @ 253.7 nm	—	—	1 min	0.1 @ 3000 A/W	≤ 2	Type is designed for UV detection within the spectral range from 180 to 355 nanometers. Has cesium-telluride photocathode and UV-grade sapphire window.
125	C70128	12 I	Be-O	1800	0.5	1500 M	3000 @ 253.7 nm	15 @ 253.7 nm	—	—	0.2	0.5 @ 3000 A/W	≤ 2	Type is designed for UV detection within the spectral range from 105 to 355 nanometers. Has cesium-telluride photocathode and lithium fluoride window.

- ^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.
- ^b Averaged over any interval of 30 seconds maximum.
- ^c For voltage distribution, see page 9.
- ^d At wavelength of maximum response of the spectral response characteristic.
- ^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.
- ^f At the maximum rated supply voltage. The photocathode is fully illuminated.
- ^g See Glossary of Terms, pages 4 and 5.
- The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.



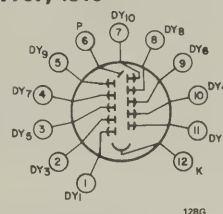
Typical Photocathode Spectral Response Characteristics[■]

7767
4802*
4516



	7767 4516	4802
A	3.94 Max.	3.80 Max.
B	3.50 +.06 - .12	3.51 ± .18
C	.30 Max.	.28 Max.
D	.38 Max.	.30 Max.
E	.75 Min.	1.5 Min.

Basing (Bottom View)
7767, 4516



Socket**

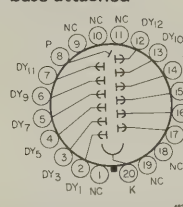
4802
AL - 220FTC
C - 20-PM

Magnetic Shield**

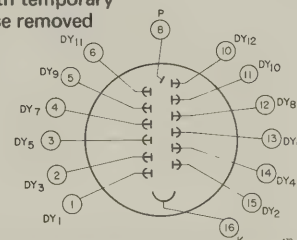
M - 80801N
P - 10P40

Basing (Bottom View) 4802

With temporary
base attached



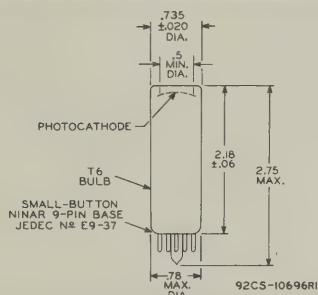
With temporary
base removed



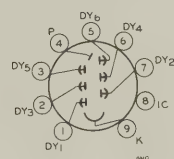
* Type is supplied with a B20-102 base attached to semiflexible leads.

• Type 4802 has 14 semiflexible leads.

7764



Basing (Bottom View)



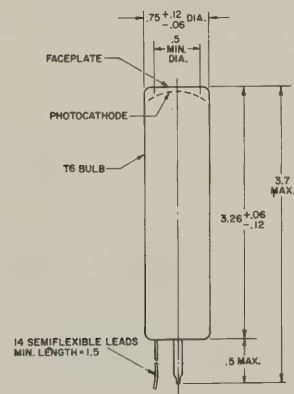
Socket**

G - 69005 - 7957

Magnetic Shield**

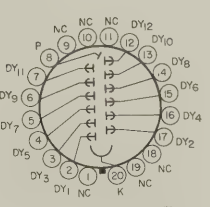
M - 80801M
P - 10P25

C31005*

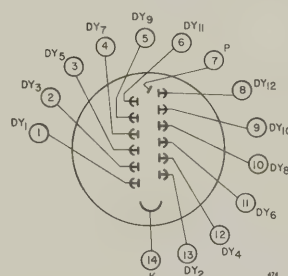


Basing (Bottom View)

With temporary
base attached



With temporary
base removed



Socket**

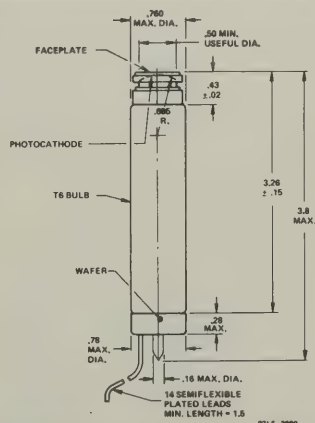
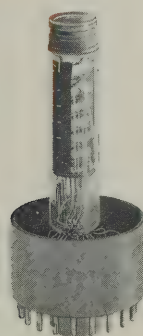
AL - 220FTC
C - 20-PM

Magnetic Shield**

M - 80801N
P - 10P40

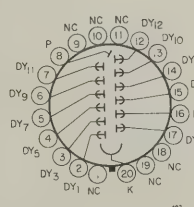
* Type is supplied with a B20-102 base attached to semiflexible leads.

C70128*

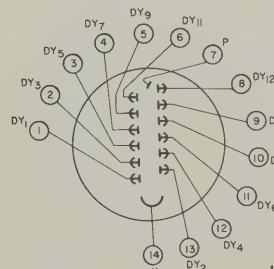


Basing (Bottom View)

With temporary
base attached



With temporary
base removed



Socket**

AL - 220FTC
C - 20-PM

Magnetic Shield**

M - 80801N
P - 10P40

* Type is supplied with a B20-102 base attached to semiflexible leads.

Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

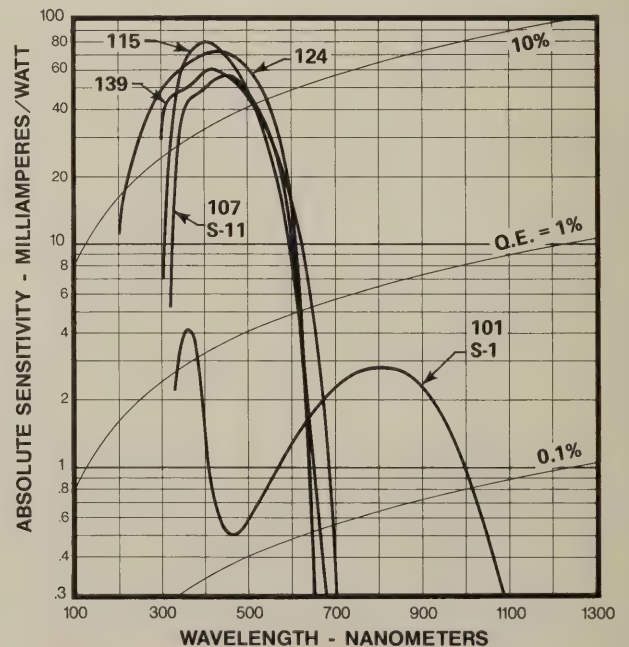
RCA Photomultipliers

3/4" -Diameter Ruggedized Head-On Types Electrostatic-Focus, In-Line Dynode Structure

Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g	
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22 °C									
				Supply Voltage V	Average ^b Anode Current mA	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns		
							Radiant ^d		Luminous ^e						
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm					
107 (S-11)	4460	10 I	Be-O	1500	0.5	1250 D	6000	48	7.5	60	0.125	6 @ 7.5	≤ 2	Parent type. Subjected to 100% testing for shock and vibration per MIL-E-5272C. Design tests for vibration and acceleration.	
101 (S-1)	C70102B	10 I	Be-O	1500	0.01	1250 E	310	2.8	3.3	30	0.11	800 @ 4	≤ 2	Variant of 4460 having S-1 response and design tests for shock, vibration and acceleration.	
107 (S-11)	C70102E	10 I	Be-O	1500	0.5	1250 E	8800	56	11	70	0.16	1.4 @ 7.5	≤ 2	Variant of 4460 having "non-magnetic" construction.	
115	C70102M	10 I	Be-O	1800	0.5	1500 E	32,000	79	27	67	0.4	0.2 @ 7	≤ 2	Variant of 4460 having a bialkali photocathode.	
124	C70102N	10 I	Be-O	1500	0.5	1250 E	4800	72	6	90	0.067	2 @ 7.5	≤ 2	Variant of 4460 having a UV-transmitting glass window.	
139	C70042S [▲]	10 I	Be-O	1800	0.5	1500 E	15,000	60	20	80	0.25	1 @ 10	≤ 2	Has high-temperature bialkali (Na-K-Sb) photocathode which permits tube operation at temperatures as high as +150° C. Has design tests for shock, vibration, and acceleration.	

▲ Objective Data

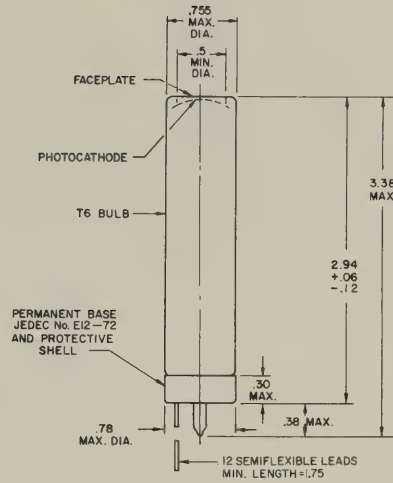
- ^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.
- ^b Averaged over any interval of 30 seconds maximum.
- ^c For voltage distribution, see page 9.
- ^d At wavelength of maximum response of the spectral response characteristic.
- ^e With a tungsten-filament lamp operated at a color temperature of 2870° K. Future data for RCA photomultipliers will be measured using a color temperature of 2854° K.
- ^f At the maximum rated supply voltage. The photocathode is fully illuminated.
- ^g See Glossary of Terms, pages 4 and 5.
- The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.



Typical Photocathode Spectral Response Characteristics[■]

4460

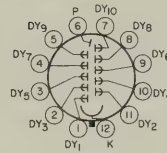
C70102B*
C70102E*
C70102M*
C70102N*



92LS-3986

* Types are supplied with a B12-43 base attached to semiflexible leads.

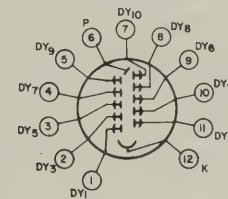
Basing (Bottom View)
C70102E,
C70102M, C70102N
With temporary
base attached



C70102B
With temporary
base removed



4460, C70102B[▲], C70102E[▲],
C70102M[▲], C70102N[▲]



▲ With temporary
base removed

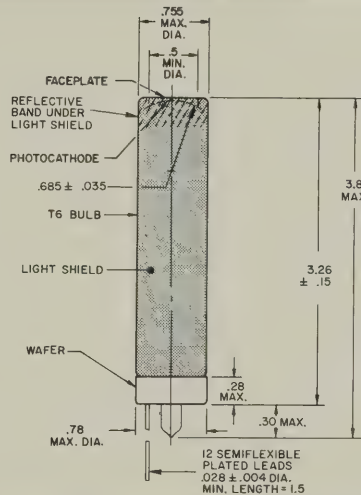
Socket**

AM - 59-402
AL - 212FTSC
C - 3M12
E - 9058

Magnetic Shield**

M - 80801N
P - 10P40

C70042S*

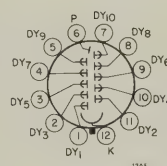


92LS-4022

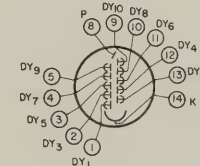
* Type is supplied with a B12-43 base attached to semiflexible leads.

Basing (Bottom View)

With temporary
base attached



With temporary
base removed



Socket**

AM - 59-402
AL - 212FTSC
C - 3M12
E - 9058

Magnetic Shield**

M - 80801N
P - 10P40

Environmental Testing					
RCA Type No.	Military Specification ^a	Quality Conformance Inspection ^b	Tests	Vibration	Acceleration
4460 C70102M C70102N	MIL-E-5272C	100%	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000 Hz 15 min total 1 sweep per axis	—
		Design	—	20 ± 2 g's 20 to 2000 Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis
C70042S C70102E	MIL-5272C	100% on special order	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000 Hz 15 min total 1 sweep per axis	—
		Design	—	20 to 2 g's 20 to 2000Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis
C70102B	MIL-E-5272C	Design	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000 Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis

^a MIL-E-5272C, 13 April 1959 Amendment 1, 5 January 1960.

^b Quality Conformance Inspection for ruggedized types:
100% — each tube tested
Sample — some tubes tested
Design — initial production tubes only tested

Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

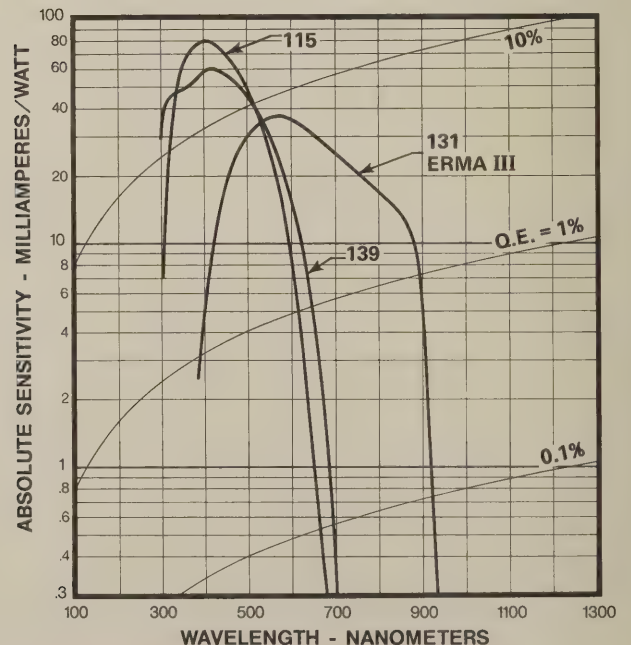
RCA Photomultipliers

1"-Diameter Head-On Types
Ruggedized and Non-Ruggedized Tubes
Electrostatic-Focus, Circular-Cage and In-Line Dynode Structures

Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g		
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Operating Supply Volts and Distribution ^c	Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C						Gain (Approx.) x 10 ⁶		Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns
				Supply Voltage V	Average ^b Anode Current mA		Sensitivity									
							Radiant ^d		Luminous ^e							
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm						
115	C31016F	10 C	Be-O	1500	0.02	1250 K	36,000	79	30	67	0.45	0.5 @ 7	≤ 1.5	Very short, bi-alkali photocathode type having design tests for shock, vibration, and acceleration per MIL-STD-810B.		
139	C31016G ^Δ	10 C	Be-O	1800	0.02	1500 K	12,000	60	17	80	0.2	0.5 @ 20	≤ 1.5	Variant of C31016F having a high-temperature bi-alkali (Na-K-Sb) photocathode which permits tube operation at temperatures as high as +150° C.		
131	C31026	12 I	Be-O	2200	0.5	1800 P	26,000	43	150	250	0.6	40 @ 50	≤ 2	Has an ERMA III photocathode. Type is designed primarily for red and near IR laser detection applications.		

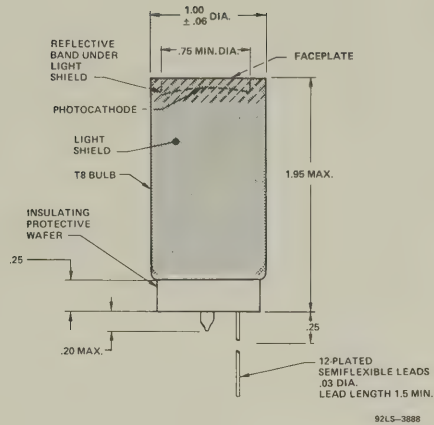
▲ Objective Data

- ^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.
- ^b Averaged over any interval of 30 seconds maximum.
- ^c For voltage distribution, see page 9.
- ^d At wavelength of maximum response of the spectral response characteristic.
- ^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.
- ^f At the maximum rated supply voltage. The photocathode is fully illuminated.
- ^g See Glossary of Terms, pages 4 and 5.
- The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.



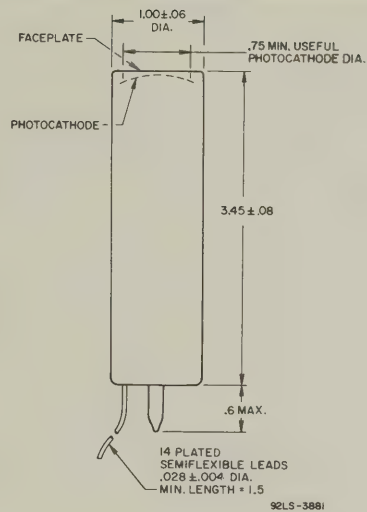
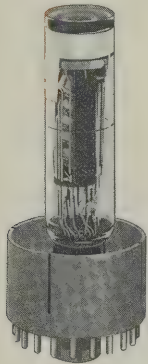
Typical Photocathode Spectral Response Characteristics[■]

C31016F*
C31016G*



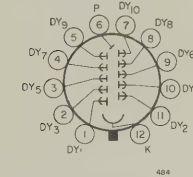
* Types are supplied with a B12-43 base attached to semiflexible leads.

C31026*

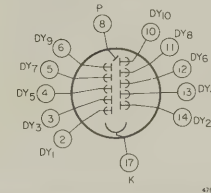


* Type is supplied with a B20-102 base attached to semiflexible leads.

Basing (Bottom View)
With temporary base attached



With temporary base removed



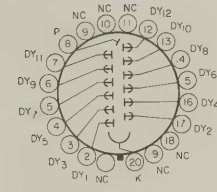
Socket**

AM - 59-402
AL - 212FTSC
C - 3M12
E - 9058

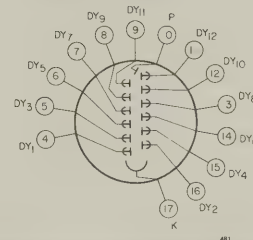
Magnetic Shield**

P - Foil or Tape

Basing (Bottom View)
With temporary base attached



With temporary base removed



Socket**

AL - 22OFTC
C - 20-PM

Magnetic Shield**

P - Foil or Tape

Environmental Testing

RCA Type No.	Military Specification ^a	Quality Conformance Inspection ^b	Tests Shock	Vibration	Acceleration
C31016F C31016G	MIL-STD-810B	Design	75 ± 7 g's 11 ± 1 ms 4 impact shocks per axis	20.7 g's 50 to 2000 Hz 1-1/2 hrs total 1 sweep per axis	100 ± 10 g's

Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

^a MIL-STD-810B, 15 June 1967

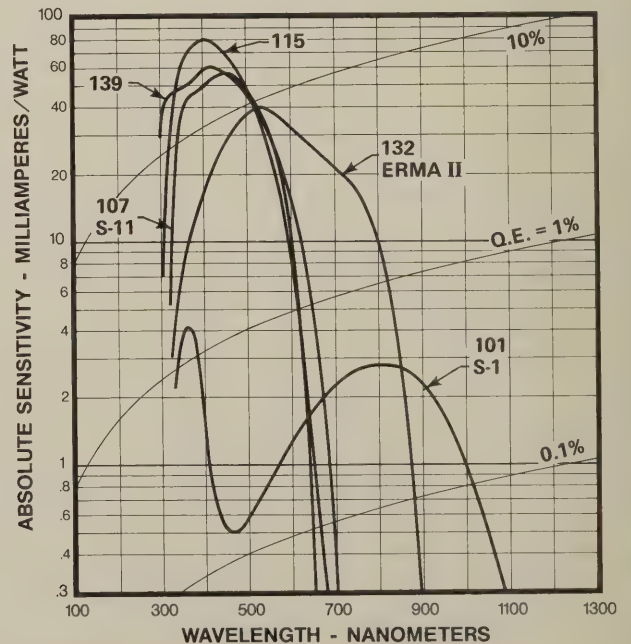
^b Quality Conformance Inspection for ruggedized types:
100% - each tube tested
Sample - some tubes tested
Design - initial production tubes only tested

1-1/2" -Diameter Head-On Types Electrostatic-Focus, Circular-Cage Dynode Structure

Spectral Response	RCA Type No.	Mechanical		Electrical											Remarks ^g
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C									
				Supply Voltage V	Average ^b Anode Current mA	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns		
							Radiant ^d		Luminous ^e						
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm					
107 (S-11)	6199	10 C	Cs-Sb	1250	0.75	1000 D	36,000	36	45	45	1	4.5 @ 20	≤ 2.5	Parent type. Designed primarily for scintillation counting systems and general applications.	
101 (S-1)	7102	10 C	Be-O	1500	0.01	1250 D	660	2.8	7	30	0.23	1900 @ 4	≤ 2.5	Variant of 6199 for red and near-IR detection systems.	
107 (S-11)	2060	10 C	Cs-Sb	1250	0.75	1000 D	36,000	36	45	45	1	4.5 @ 20	≤ 2.5	Variant of 6199 supplied with base attached to semi-flexible leads.	
115	4517	10 C	Be-O	1800	0.5	1500 G	56,000	79	47	67	0.7	0.2 @ 7	≤ 2	Variant of 6199 having a bialkali photocathode.	
132	C7151W	10 C	Be-O	1500	0.5	1250 G	10,000	40	50	200	0.25	1 @ 20	≤ 2.5	Variant of 6199 having an ERMA II photocathode. Type is designed for red and near IR applications.	
139	C7155AA [▲]	10 C	Be-O	1800	0.5	1500 G	19,000	60	25	80	0.31	0.4 @ 10	≤ 2	Variant of 6199 having a high-temperature bialkali (Na-K-Sb) photocathode which permits tube operation at temperatures as high as +150° C.	

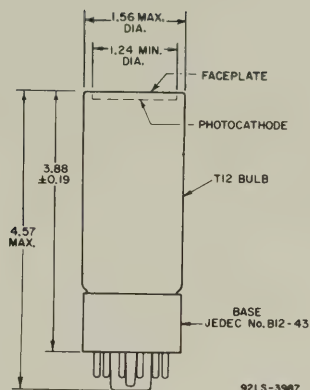
▲ Objective Data

- ^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.
- ^b Averaged over any interval of 30 seconds maximum.
- ^c For voltage distribution, see page 9.
- ^d At wavelength of maximum response of the spectral response characteristic.
- ^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.
- ^f At the maximum rated supply voltage. The photocathode is fully illuminated.
- ^g See Glossary of Terms, pages 4 and 5.
- The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.

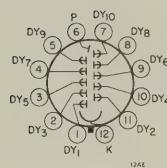


Typical Photocathode Spectral Response Characteristics[■]

6199
7102
4517
C7151W
C7151AA



Basing (Bottom View)



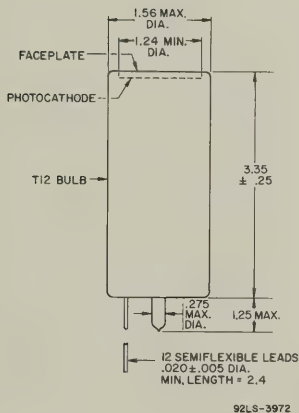
Socket**

AM - 59-402
AL - 212FTSC
C - 3M12
E - 9058

Magnetic Shield**

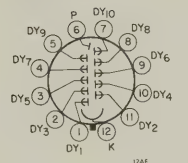
J - S-1561
M - 80802C
P - 17P45

2060*

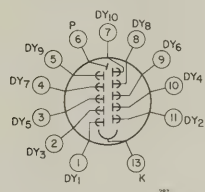


Basing (Bottom View)

With temporary
base attached



With temporary
base removed



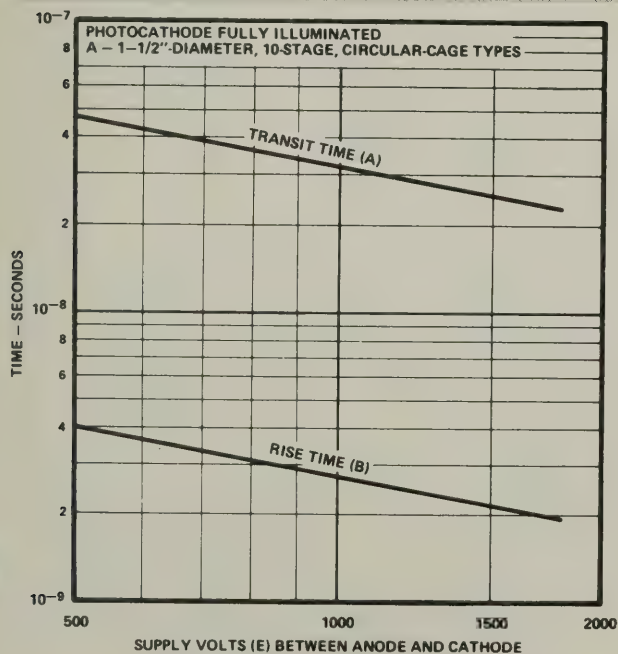
Socket**

AM - 59-402
AL - 212FTSC
C - 3M12
E - 9058

Magnetic Shield**

J - S-1561
M - 80802C
P - 17P45

* Type is supplied with a B12-43 base attached to semiflexible leads.



Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

Typical Time Response Characteristics for 1-1/2" Diameter, 10-Stage Photomultipliers

RCA Photomultipliers

1-1/2" -Diameter Head-On Types (cont'd) Electrostatic-Focus, Circular-Cage Dynode Structure

Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g	
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C									
				Supply Voltage V	Average ^b Anode Current mA	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns		
							Radiant ^d		Luminous ^e						
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μ A/lm					
127	C7151U	10 C	Cs-Sb	1250	0.75	1000 G	8200	25	20	60	0.33	10 @ 40	≤ 2.5	Similar to 6199 but has 1"-diameter minimum Ag-O-Cs-Bi cathode and UV-transmitting glass window. Spectral range from 200 to 760 nanometers.	
137	C7151Y	10 C	Be-O	1500	0.5	1250 G	2400	40	12	200	0.06	3 @ 10	≤ 2.5	Variant of C7151U having an ERMA II photocathode, an ultra-violet transmitting glass window, and copper-beryllium dynodes. Has a spectral range of 200 to 880 nanometers.	
138	C7151Z	10 C	Cs-Sb	1500	0.5	1250 G	30,000	73	70	170	0.41	10 @ 40	≤ 2.5	Variant of C7151U having an ERMA I photocathode. Has a multialkali photocathode peaked in the blue region of the spectrum.	
107 (S-11)	4438	10 C	Cs-Sb	1250	0.75	1000 G	21,600	36	27	45	0.6	16 @ 20	≤ 2.5	Sturdy type for compact scintillation counting systems. Has semiflexible leads.	
107 (S-11)	4439	10 C	Cs-Sb	1250	0.75	1000 G	21,600	36	27	45	0.6	16 @ 20	≤ 2.5	Variant of 4438 supplied with temporary base attached to semiflexible leads.	
107 (S-11)	4440	10 C	Cs-Sb	1250	0.75	1000 D	21,600	36	27	45	0.6	16 @ 20	≤ 2.5	Variant of 4439 supplied with permanently attached base.	
107 (S-11)	2067	10 C	Cs-Sb	1250	0.75	1000 D	16,200	60	20	74	0.27	2.6 @ 20	≤ 2.5	Has a hemispherical faceplate which allows collection of radiation over a solid angle of greater than 2 π steradians.	

^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.

^b Averaged over any interval of 30 seconds maximum.

^c For voltage distribution, see page 9.

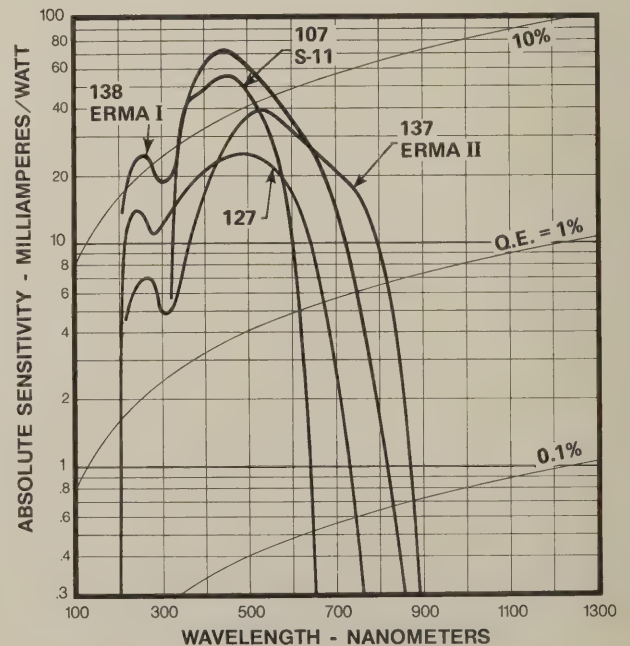
^d At wavelength of maximum response of the spectral response characteristic.

^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.

^f At the maximum rated supply voltage. The photocathode is fully illuminated.

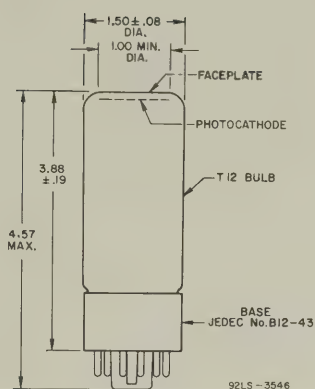
^g See Glossary of Terms, pages 4 and 5.

■ The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.

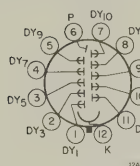


Typical Photocathode Spectral Response Characteristics[■]

C7151U
C7151Y
C7151Z



Basing (Bottom View)

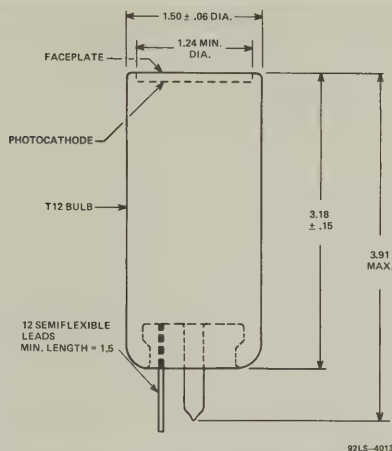


Socket**
AM - 59-402
AL - 212FTSC
C - 3M12
E - 9058

Magnetic Shield**

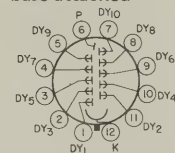
J - S-1561
M - 80802C
P - 17P45

4438
4439*

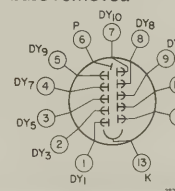


Basing (Bottom View) 4439

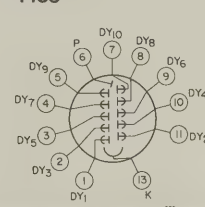
With temporary base attached



With temporary base removed



Basing (Bottom View) 4438



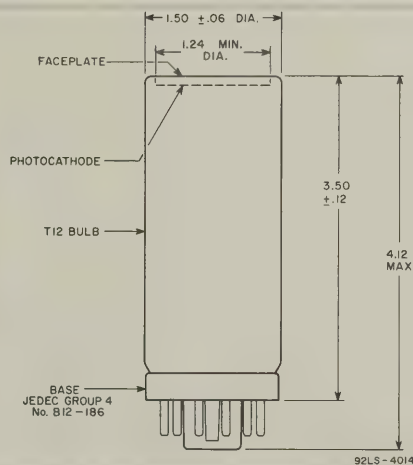
Socket**
AM - 59-402
AL - 212FTSC
C - 3M12
E - 9058

Magnetic Shield**

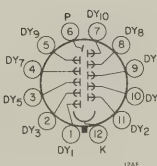
P - 17P30

* Type is supplied with a B12-43 base attached to semiflexible leads.

4440



Basing (Bottom View)

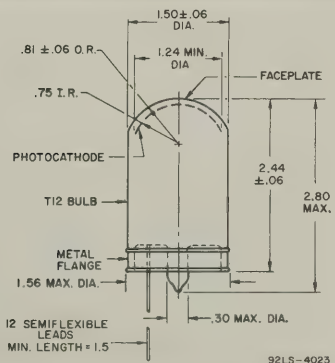


Socket**
AM - 59-402
AL - 212FTSC
C - 3M12
E - 9058

Magnetic Shield**

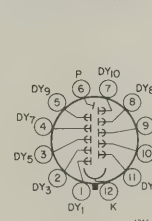
P - 17P30

2067*

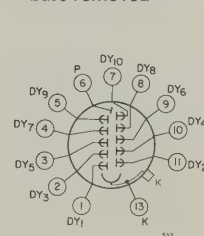


Basing (Bottom View)

With temporary base attached



With temporary base removed



Socket**
AM - 59-402
AL - 212FTSC
C - 3M12
E - 9058

Magnetic Shield**

P - Foil or Tape

* Type is supplied with a B12-43 base attached to semiflexible leads.

Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

RCA Photomultipliers

1-1/2" -Diameter Ruggedized Head-On Types Electrostatic-Focus, Circular-Cage Dynode Structure

Spectral Re- sponse	RCA Type No.	Mechanical		Electrical										Remarks ^g
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C								
				Supply Voltage V	Average ^b Anode Current mA	Oper- ating Supply Volts and Distri- bution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns	
							Radiant ^d		Luminous ^e					
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm				
107 (S-11)	4441A	10 C	Cs-Sb	1250	0.75	1000 D	21,600	36	27	45	0.6	16 @ 20	≤ 2.5	Parent type. Each tube is subjected to 100% testing for shock and vibration per MIL-E-5272C. Design tests for vibration and acceleration.
107 (S-11)	4441	10 C	Cs-Sb	1250	0.75	1000 D	21,600	36	27	45	0.6	16 @ 20	≤ 2.5	Variant of 4441A having design tests for shock, vibration, and acceleration per MIL-E-5272C.
107 (S-11)	4461	10 C	Be-O	1500	1.0	1250 D	8000	48	10	60	0.17	5 @ 10	≤ 2.5	Variant of 4441A having copper-beryllium dynodes. Each tube is subjected to 100% testing for shock and vibration per MIL-E-5272C. Design tests for vibration and acceleration.
110 (S-20)	C70114C	10 C	Be-O	1800	1.0	1500 G	10,800	77	25	180	0.14	4 @ 10	≤ 2	Variant of 4461 having S-20 response. Has design tests for shock, vibration, and acceleration per MIL-E-5272C.
115	C70114F	10 C	Be-O	1800	0.5	1500 G	39,000	79	33	67	0.49	0.3 @ 7	≤ 2	Variant of C70114C having a bialkali photocathode. Has design tests for shock, vibration, and acceleration per MIL-E-5272C.
117	C70114J	10 C	Be-O	1800	0.5	1500 G	39,000	79	33	67	0.49	0.3 @ 7	≤ 2	Variant of C70114F having a UV-transmitting glass window. Is 100% tested for shock and vibration per MIL-E-5272C on special order.

^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.

^b Averaged over any interval of 30 seconds maximum.

^c For voltage distribution, see page 9.

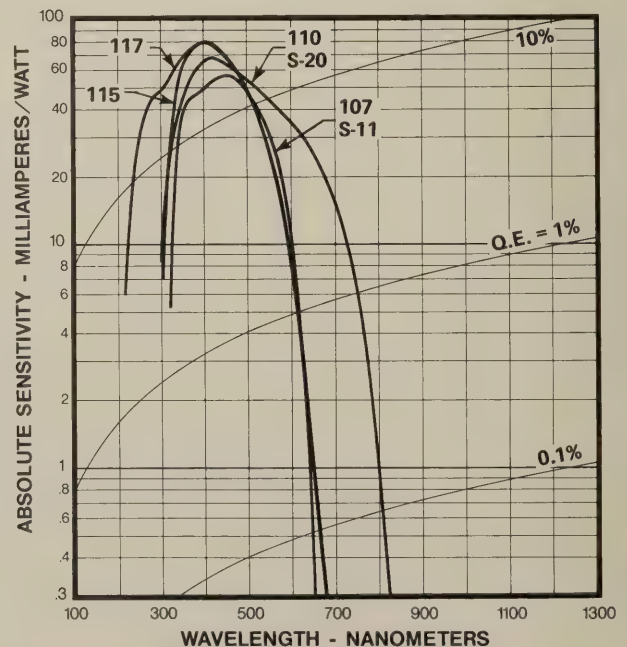
^d At wavelength of maximum response of the spectral response characteristic.

^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.

^f At the maximum rated supply voltage. The photocathode is fully illuminated.

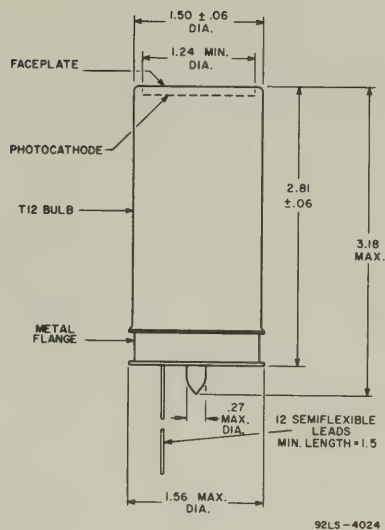
^g See Glossary of Terms, pages 4 and 5.

■ The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.



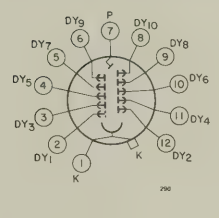
Typical Photocathode Spectral Response Characteristics[■]

4441A
4441
4461
C70114C*
C70114F*
C70114J*

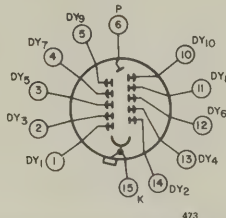


92LS-4024

Basing (Bottom View)
4441A, 4441, 4461

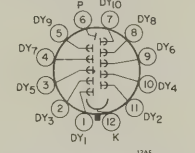


C70114C
With temporary
base removed

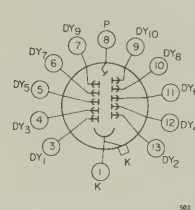


Basing (Bottom View)
C70114C, C70114F,
C70114J

With temporary
base attached



C70114F, C70114J
With temporary
base removed



Socket**

AM - 59-402
AL - 212FTSC
C - 3M12
E - 9058

Magnetic Shield**

P - 17P30

* Types are supplied with a B12-43 base attached to semiflexible leads.

Environmental Testing					
RCA Type No.	Military Specification ^a	Quality Conformance Inspection ^b	Tests Shock	Vibration	Acceleration
4441A 4461	MIL-E-5272C	100%	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000 Hz 15 min total 1 sweep per axis	—
		Design	—	20 ± 2 g's 20 to 2000 Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis
C70114J	MIL-E-5272C	100% on special order	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000 Hz 15 min total 1 sweep per axis	—
		Design	—	20 ± 2 g's 20 to 2000 Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis
4441 C70114C C70114F	MIL-E-5272C	Design	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000 Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis

^a MIL-E-5272C, 13 April 1959 Amendment 1, 5 January 1960.

^b Quality Conformance Inspection for ruggedized types:

100% — each tube tested

Sample — some tubes tested

Design — initial production tubes only tested

Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

1-1/2" -Diameter Ruggedized Head-On Types (cont'd) Electrostatic-Focus, Circular-Cage Dynode Structure

Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g	
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22° C									Anode Pulse Rise Time ^f ns
				Supply Voltage V	Average ^b Anode Current mA	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm			
							Radiant ^d		Luminous ^e						
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm					
107 (S-11)	C7151N	10 C	Be-O	1600	0.5	1500 G	57,000	70	70	85	0.82	0.8 @ 20	≤ 2.5	Type is subjected to 100% testing for vibration per MIL-E-5272C. Design tests for shock, vibration, and acceleration. "Non-magnetic" construction employed.	
115	C7151Q	10 C	Be-O	1800	0.5	1500 G	39,000	79	33	67	0.49	0.3 @ 7	≤ 2	Variant of C7151N having a bialkali photocathode. Has design tests for shock, vibration, and acceleration per MIL-E-5272C.	
107 (S-11)	C70132B	10 C	Be-O	1600	0.5	1500 G	57,000	70	70	85	0.82	0.8 @ 20	≤ 2.5	Ruggedized variant of 2067. Each tube is 100% tested for vibration per MIL-E-5272C. Design tests for shock, vibration, and acceleration.	
115	C70132A	10 C	Be-O	1800	0.5	1500 G	65,000	79	55	67	0.82	0.4 @ 6.7	≤ 2	Variant of C70132B having a bialkali photocathode. Has design tests for shock, vibration, and acceleration per MIL-E-5272C.	

^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.

^b Averaged over any interval of 30 seconds maximum.

^c For voltage distribution, see page 9.

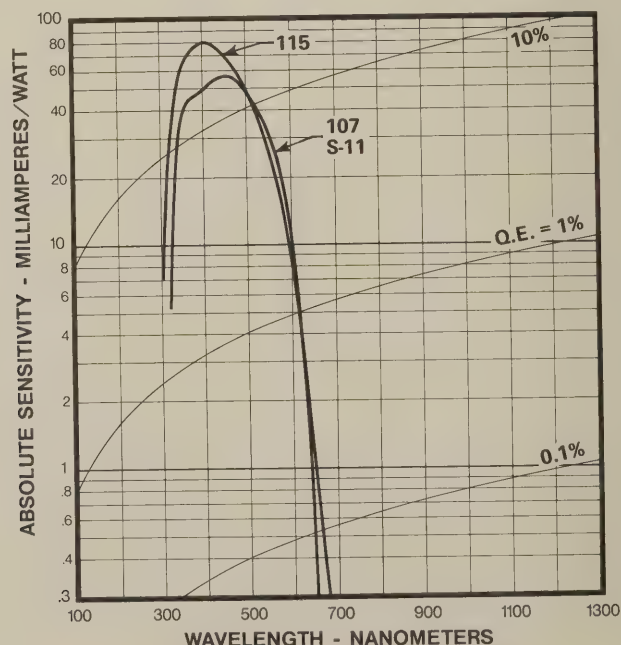
^d At wavelength of maximum response of the spectral response characteristic.

^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.

^f At the maximum rated supply voltage. The photocathode is fully illuminated.

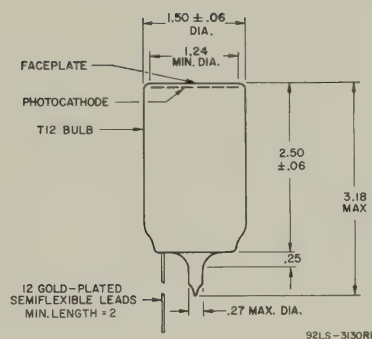
⁹ See Glossary of Terms, pages 4 and 5.

■ The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.

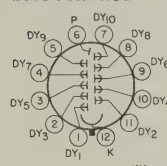


Typical Photocathode Spectral Response Characteristics[■]

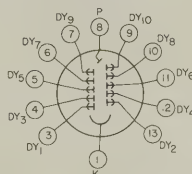
C7151N*
C7151Q*



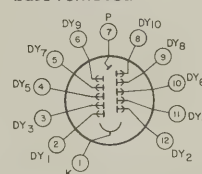
Basing (Bottom View)
C7151N, C7151Q
With temporary
base attached



C7151Q
With temporary
base removed



C7151N
With temporary
base removed



Socket**

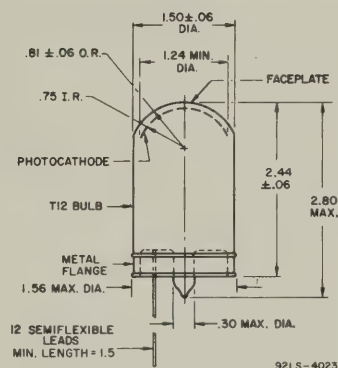
AM — 59-402
AL — 212FTSC
C — 3M12
E — 9058

Magnetic Shield**

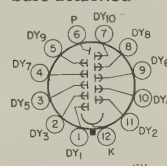
P — Foil or tape

* Types are supplied with a B12-43 base attached to semiflexible leads.

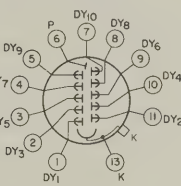
C70132B*
C70132A*



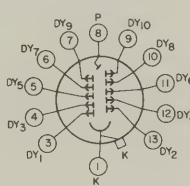
Basing (Bottom View)
C70132B, C70132A
With temporary
base attached



C70132A
With temporary
base removed



C70132B
With temporary
base removed



Socket **

AM — 59-402
AL — 212FTSC
C — 3M12
E — 9058

Magnetic Shield**

P — Foil or tape

* Types are supplied with a B12-43 base attached to semiflexible leads.

Environmental Testing					
RCA Type No.	Military Specification ^a	Quality Conformance Inspection ^b	Tests	Vibration	Acceleration
C7151N C70132B	MIL-E-5272C	100%	—	20 ± 2 g's 20 to 2000 Hz 15 min total 1 sweep per axis	—
		Design	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000 Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis
C7151Q C70132A	MIL-E-5272C	Design	30 ± 3 g's 11 ± 1 ms 6 impact shocks per axis	20 ± 2 g's 20 to 2000 Hz 6 hrs total 2 sweeps per axis	100 ± 10 g's 1 min per axis

a MIL-E-5272C, 13 April 1959 Amendment 1, 5 January 1960.

b Quality Conformance Inspection for ruggedized types:

100% — each tube tested

Sample — some tubes tested

Design — initial production tubes only tested

Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

RCA Photomultipliers

2" -Diameter Head-On Types Electrostatic-Focus, Circular-Cage Dynode Structure

Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C								
				Supply Voltage V	Average Anode Current mA ^b	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns	
							Radiant ^d		Luminous ^e					
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm				
107 (S-11)	6342A	10 C	Be-O	1500	2.0	1250 D	25,000	64	31	80	0.39	4 @ 20	≤ 3.0	Parent type. Designed for scintillation counting systems and general purpose applications.
107 (S-11)	2061	10 C	Be-O	1500	2.0	1250 D	—	64	—	80	—	—	≤ 3.0	Variant of 6342A having semi-flexible leads attached to temporary base.
115	4518	10 C	Be-O	2000	0.5	1500 H	39,000	79	33	67	0.49	0.24 @ 7	≤ 2.5	Variant of 6342A having a bialkali photocathode.
132	C7164S	10 C	Be-O	1500	0.5	1250 H	20,000	40	100	200	0.5	30 @ 150	≤ 3.0	Variant of 6342A having an ERMA II photocathode. Designed for red and near IR detection applications.
132	C7164R	10 C	Be-O	1500	0.5	1250 H	20,000	40	100	200	0.5	30 @ 150	≤ 3.0	Variant of C7164S having shorter overall length.

^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.

^b Averaged over any interval of 30 seconds maximum.

^c For voltage distribution, see page 9.

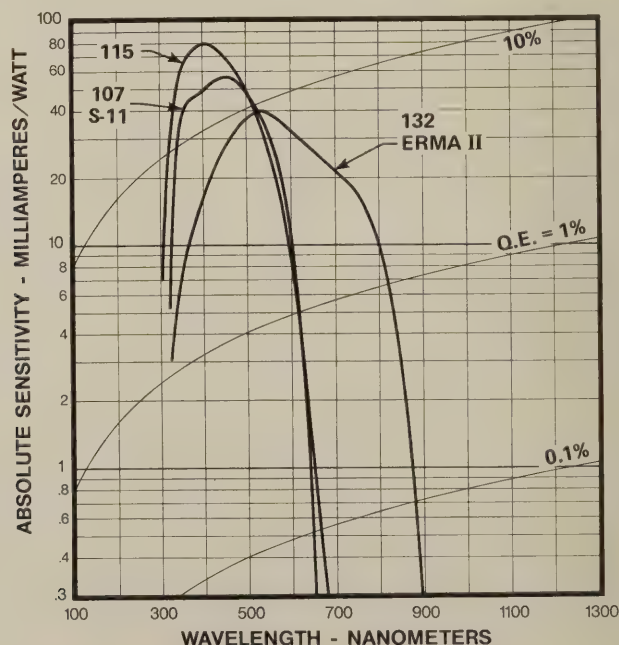
^d At wavelength of maximum response of the spectral response characteristic.

^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.

^f At the maximum rated supply voltage. The photocathode is fully illuminated.

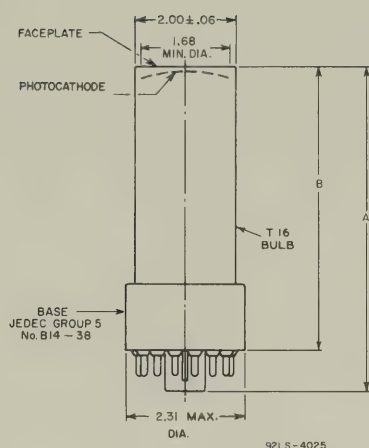
^g See Glossary of Terms, pages 4 and 5.

■ The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.

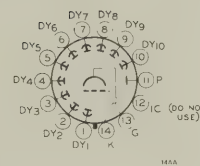


Typical Photocathode Spectral Response Characteristics[■]

6342A
4518
C7164S
C7164R



Basing (Bottom View)

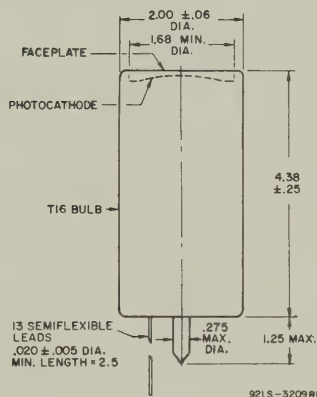


Socket**
AM— 59-417
C — 3M14
E — 9709-7
L — 2274

Magnetic Shield**
J — S-2004
M — 80802B
P — 25P50

	A	B
6342A	5.81 Max.	4.87 ± .19
4518		
C7164S		
C7164R	5.2 Max.	4.25 ± .19

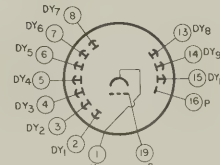
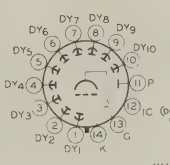
2061*



Basing (Bottom View)

With temporary
base attached

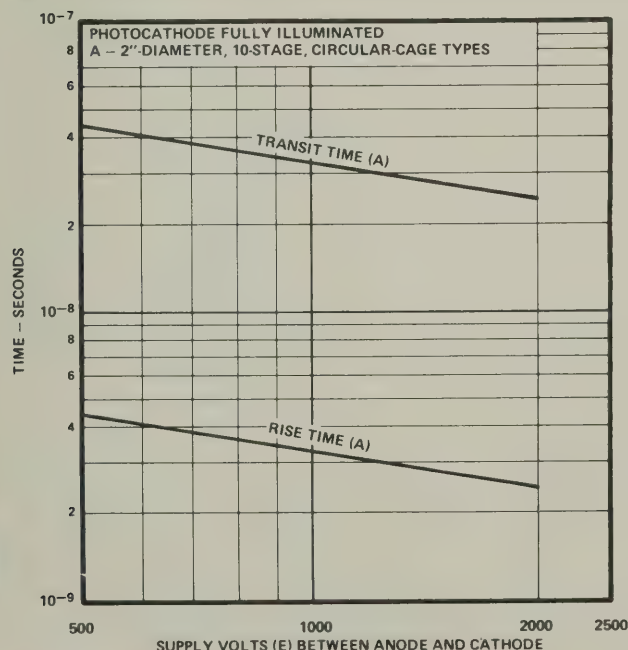
With temporary
base removed



Socket**
AM— 59-417
C — 3M14
E — 9709-7
L — 2274

Magnetic Shield**
J — S-2004
M — 80802B
P — 25P50

* Type is supplied with a B14-38 base attached to semiflexible leads.



Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

Typical Time Response Characteristics for 2"-Diameter,
10-Stage, Circular-Cage Photomultipliers

RCA Photomultipliers

2" -Diameter Head-On Types (cont'd) Electrostatic-Focus, Circular-Cage Dynode Structure

Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22 °C								
				Supply Voltage V	Average Anode Current mA ^b	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns	
							Radiant ^d		Luminous ^e					
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μ A/lm				
107 (S-11)	6655A	10 C	Cs-Sb	1250	0.75	1000 D	96,000	61	120	76	1.6	6 @ 20	≤ 3.0	Similar to 6342A except has Cs-Sb dynodes.
108 (S-13)	6903	10 C	Cs-Sb	1250	0.75	1000 D	72,000	48	90	60	1.5	10 @ 20	≤ 3.0	Variant of 6655A having S-13 response.
107 (S-11)	2020	10 C	Be-O	1500	2.0	1250 D	4800	40	6	50	0.12	4 @ 20	≤ 3.0	Has photocathode deposited on grating of conductive strips allowing high peak cathode current capability.
107 (S-11)	5819	10 C	Cs-Sb	1250	0.75	1000 D	80,000	40	100	50	2	6 @ 20	≤ 3.0	Parent type. Intended for general-purpose applications.
106 (S-10)	6217	10 C	Cs-Sb	1250	0.75	1000 D	50,000	20	100	40	2.5	28 @ 20	≤ 3.0	Variant of 5819 having S-10 response. Intended primarily for color densitometers, color comparators, and spectrometers.

^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.

^b Averaged over any interval of 30 seconds maximum.

^c For voltage distribution, see page 9.

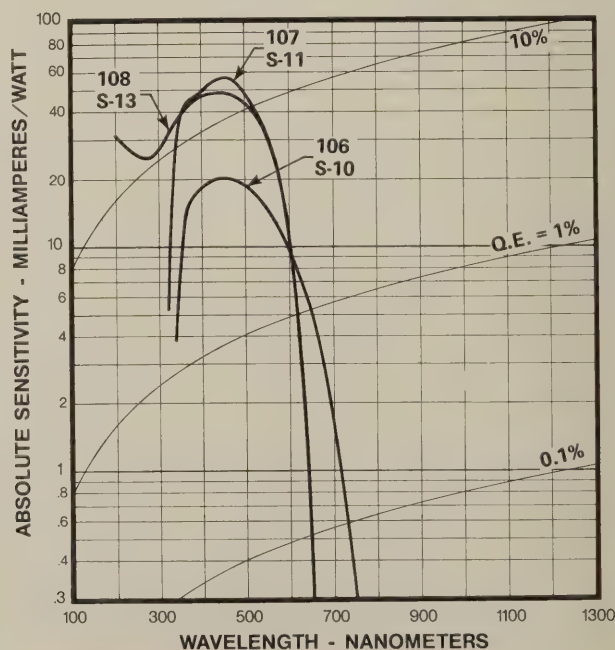
^d At wavelength of maximum response of the spectral response characteristic.

^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.

^f At the maximum rated supply voltage. The photocathode is fully illuminated.

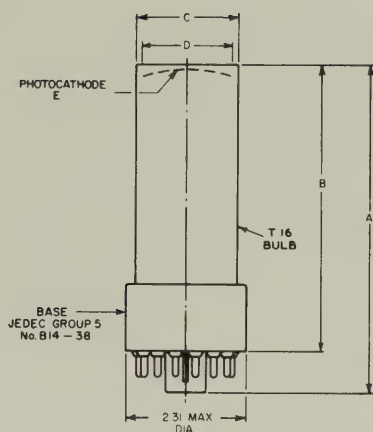
^g See Glossary of Terms, pages 4 and 5.

■ The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.



Typical Photocathode Spectral Response Characteristics[■]

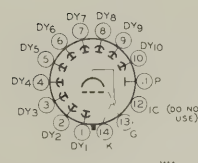
**6655A
6903**



92LS-3883

	6655A	6903
A	5.81 Max.	6-9/16 Max.
B	4.87 ± 0.19	5-5/8 ± 3/16
C	2.00 ± 0.06 Dia.	2 ± 5/32 Dia.
D	1.68 Min. Dia.	1-5/8 Min. Dia.
E	Curved	Flat

Basing (Bottom View)



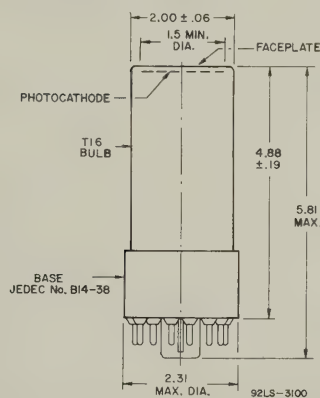
Socket**

AM - 59-417
C - 3M14
E - 9709-7
L - 2274

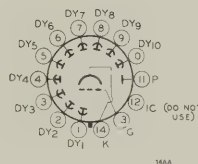
Magnetic Shield**

J - S-2003
M - 80802E
P - 25P50

2020



Basing (Bottom View)



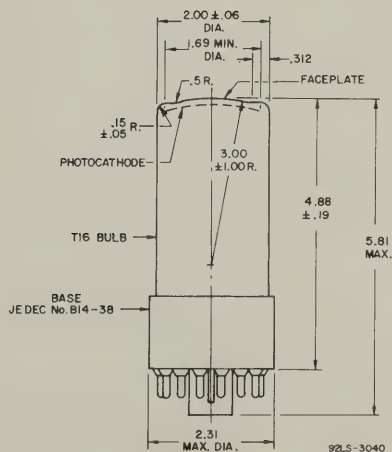
Socket**

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C - 3M14
E - 9709-7
L - 2274

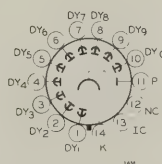
Magnetic Shield**

J - S-2003
M - 80802E
P - 25P50

**5819
6217**



Basing (Bottom View)



Socket**

AM - 59-417
C - 3M14
E - 9709-7
L - 2274

Magnetic Shield**

J - S-2004
M - 80802B
P - 25P50

Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

RCA Photomultipliers

2" -Diameter Head-On Types Electrostatic-Focus, In-Line Dynode Structure

Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g	
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C									Anode Pulse Rise Time ^f ns
				Supply Voltage V	Average ^b Anode Current mA	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm			
							Radiant ^d		Luminous ^e						
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm					
107 (S-11)	6810A	14 I	Be-O	2400	2.0	2000 W	3,000,000	56	3800	70	54	1000 @ 2000	≤ 3.5	Parent type. Intended for scintillation counting systems and general-purpose applications.	
110 (S-20)	7265	14 I	Be-O	3000	1.0	2400 W	3,100,000	64	7200	150	48	50 @ 1000	≤ 3.0	Variant of 6810A having S-20 response. Intended for red and near IR systems.	
110 (S-20)	7326	10 I	Be-O	2400	1.0	1800 D	37,500	64	88	150	0.59	3 @ 20	≤ 2.5	Variant of 7265 having 10-stages.	
107 (S-11)	7850	12 I	Be-O	2600	2.0	1800 Q	510,000	56	640	70	9.1	64 @ 160	≤ 2.0	Parent type. Intended for scintillation counting and general-purpose applications.	
107 (S-11)	7746	10 I	Be-O	2500	2.0	2000 J	960,000	56	1200	70	17	250 @ 230	≤ 2.0	Variant of 7850 having 10 stages.	
101 (S-1)	C70007A	12 I	Be-O	2000	0.01	1250 Q	940	2.8	10	30	0.33	400 @ 4	≤ 2.5	Variant of 7850 having S-1 response. Intended for red and near IR systems.	

^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.

^b Averaged over any interval of 30 seconds maximum.

^c For voltage distribution, see page 9.

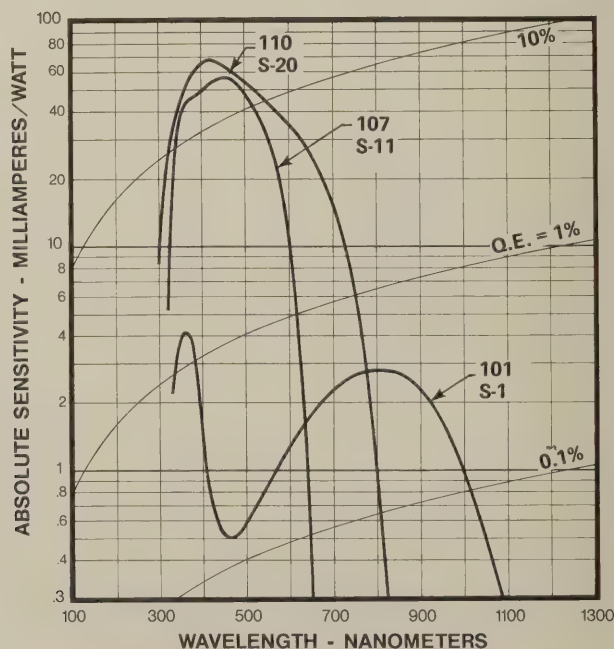
^d At wavelength of maximum response of the spectral response characteristic.

^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.

^f At the maximum rated supply voltage. The photocathode is fully illuminated.

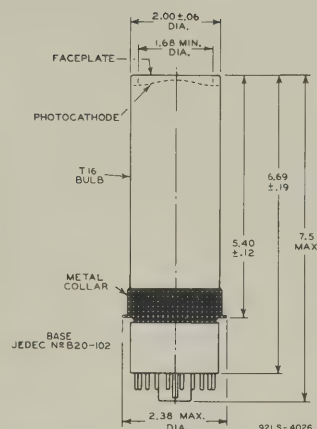
^g See Glossary of Terms, pages 4 and 5.

■ The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.

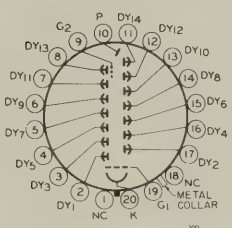


Typical Photocathode Spectral Response Characteristics ■

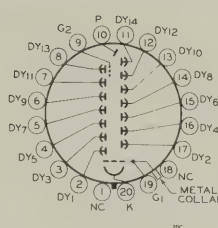
6810A 7265



Basing (Bottom View)
6810A



Basing (Bottom View)
7265



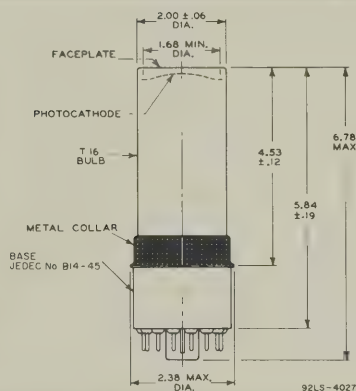
Socket**

AL - 220FTC
C - 20-PM

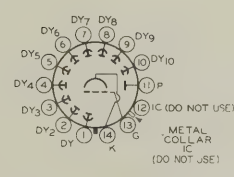
Magnetic Shield**

J - S-2002
M - 80802E
P - 21P55V1, 22P60

7326



Basing (Bottom View)



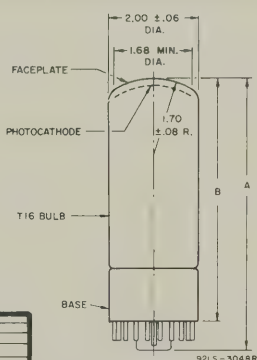
Socket**

C - 3M14
E - 9709-7
L - 2274

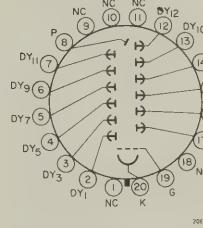
Magnetic Shield**

M - 80802N
P - 21P45V1

7850 C70007A 7746



Basing (Bottom View)
7850, C70007A



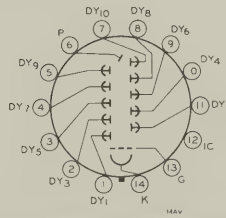
Socket**

7850, C70007A
AL - 220FTC
C - 20-PM

Magnetic Shield**

7850, C70007A
P - 22P60

Basing (Bottom View)
7746

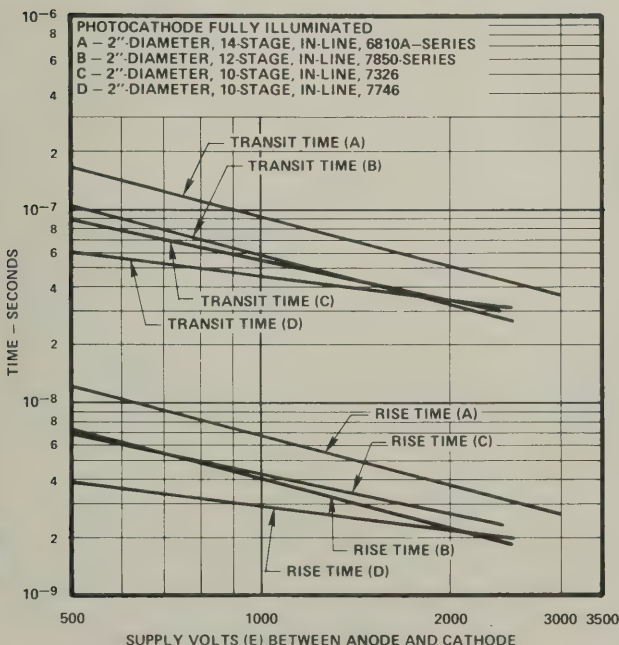


Socket**

7746
AM - 59-417
C - 3M14
E - 9709-7
L - 2274

Magnetic Shield**

7746
P - 25P50



	7850 C70007A	7746
A	6.31 Max.	6.12 Max.
B	5.50 ± .19	5.18 ± .19
Base	B20-102	B14-38

Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

2" -Diameter QUANTACON Head-On Types Ga-As and Ga-In-As Photocathodes Electrostatic-Focus, In-Line Dynode Structure

Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g	
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22 °C									
				Supply Voltage V	Average ^b Anode Current mA	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns		
							Radiant ^d		Luminous ^e						
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm					
128	C31034	11 I	Be-O	2000	0.01	1500 L	41,000	68	300	500	0.6	3 @ 100	≤ 2.5	Variant of 8575 having 11 stages, a Ga-As photocathode, and a UV-transmitting glass window. The photocathode surface of this tube has a minimum sensitive area of 4 x 10 mm. Its spectral range extends from about 200 to 930 nm.	
128	C31034A▲	11 I	Be-O	2000	0.01	1500 L	62,000	155	400	1000	0.4	3 @ 100	≤ 2.5	Variant of C31034 having extremely high sensitivity.	
140	C31034B▲	11 I	Be-O	2000	0.01	1500 L	14,000	57	100	400	0.25	10 @ 100	≤ 2.5	Variant of C31034 having a Ga-In-As Type I photocathode. Its spectral range extends from about 200 to 980 nanometers.	
141	C31034C▲	11 I	Be-O	2000	0.01	1500 L	16,000	47	100	300	0.33	10 @ 100	≤ 2.5	Variant of C31034 having a Ga-In-As Type II photocathode. Has a spectral response range from about 200 to 1030 nanometers.	
142	C31034D▲	11 I	Be-O	2000	0.01	1500 L	17,000	42	60	150	0.4	10 @ 50	≤ 2.5	Variant of C31034 having a Ga-In-As Type III photocathode. Has a spectral response range from about 200 to 1100 nanometers.	

▲ Objective Data

^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.

^b Averaged over any interval of 30 seconds maximum.

^c For voltage distribution, see page 9.

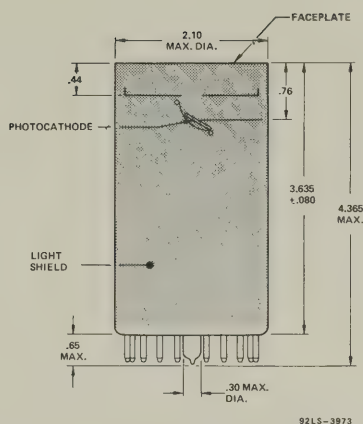
^d At wavelength of maximum response of the spectral response characteristic.

^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.

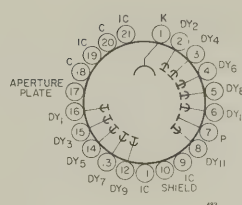
^f At the maximum rated supply voltage. The photocathode is fully illuminated.

^g See Glossary of Terms, pages 4 and 5.

C31034
C31034A
C31034B
C31034C
C31034D

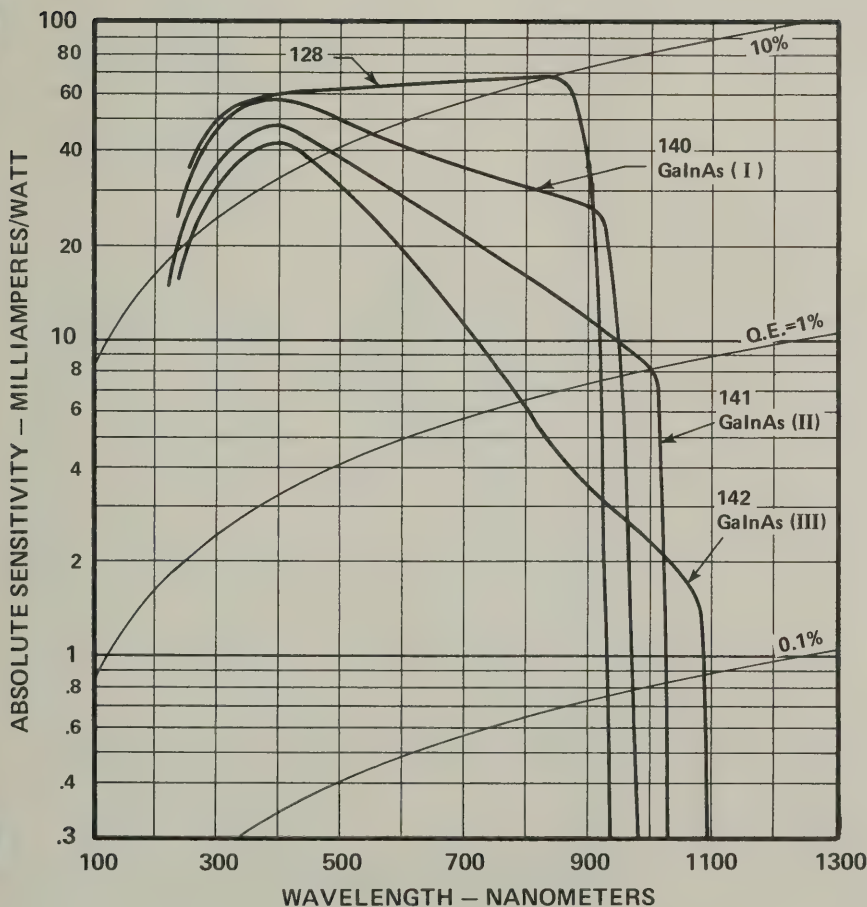


Basing (Bottom View)



Socket**
RCA♦ — AJ2144
AJ2145
AJ2180

Magnetic Shield**
P — 22P40



Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

♦ See pages 12 and 13 for description of these accessories.

■ The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.

RCA Photomultipliers

2" -Diameter QUANTACON Head-On Types Ga-P First Dynode or All Ga-P Dynode Material Electrostatic-Focus, In-Line Dynode Structure

				Mechanical		Electrical										
Spectral Response	RCA Type No.	No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C										Remarks ^g
				Supply Voltage V	Average ^b Anode Current mA	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns			
							Radiant ^d		Luminous ^e							
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm						
116	8850	12 I	Dyl-Ga-P Dy2-12 Be-O	3000	0.2	2000 T	710,000	97	620	85	7.3	0.6 @ 200	≤ 2.5	Parent type. Has a Ga-P first dynode and a bialkali photocathode. A premium tube for photon and low-energy counting applications.		
116	8851	12 I	Dyl-Ga-P Dy2-12 Be-O	3000	0.2	2000 T	710,000	97	620	85	7.3	0.6 @ 200	≤ 2.5	Variant of 8850 having a spherical-section face-plate.		
119	8852	12 I	Dyl-Ga-P Dy2-12 Be-O	2500	1.0	1500 S	16,000	37	100	230	0.43	10 @ 100	≤ 2.5	Variant of 8850 having an ERMA III photocathode. An excellent tube for laser detection and Raman spectroscopy.		
119	8853	12 I	Dyl-Ga-P Dy2-12 Be-O	2500	1.0	1500 S	16,000	37	100	230	0.43	10 @ 100	≤ 2.5	Variant of 8852 having a spherical-section face-plate.		
118	C31000N ^j	12 I	Dyl-Ga-P Dy2-12 Be-O	3000	0.2	2000 T	710,000	97	620	85	7.3	0.6 @ 200	≤ 2.5	Variant of 8850 having a UV-transmitting glass window providing a spectral response range from about 200 to 660 nanometers.		
133	C31000M ^j	12 I	Dyl-Ga-P Dy2-12 Be-O	3000	0.2	2000 T	710,000	97	620	85	7.3	0.6 @ 200	≤ 2.5	Variant of 8850 having a fused-silica window providing a spectral response range from about 180 to 660 nanometers.		
115	C31024	5 I	Ga-P	2750 to 4500 ^k	0.1 ^m	3000 A	430,000	87	360	73	5	— @ 3500V	≤ 1.0	A 5-stage type employing a bialkali photocathode and all Ga-P dynodes. This tube has a single-electron anode-pulse rise time of 0.8 nanoseconds and is designed for nuclear physics and other applications requiring subnanosecond time response.		

^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.

^b Averaged over any interval of 30 seconds maximum.

^c For voltage distribution, see page 9.

^d At wavelength of maximum response of the spectral response characteristic.

^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.

^f At the maximum rated supply voltage. The photocathode is fully illuminated.

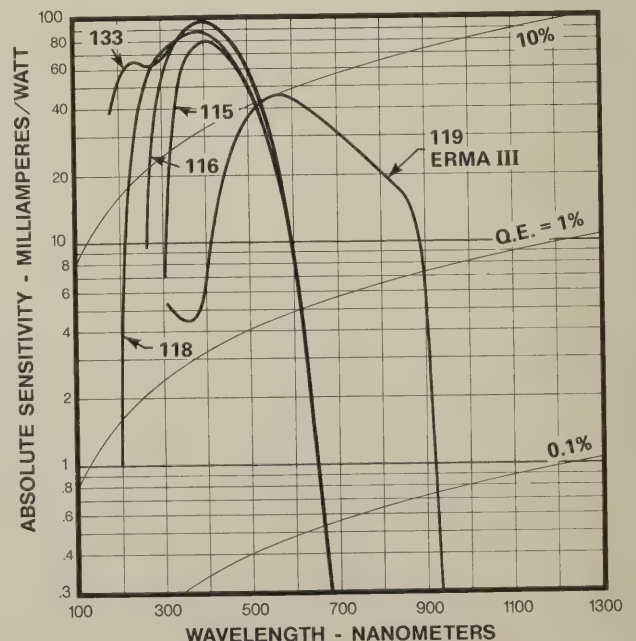
^g See Glossary of Terms, pages 4 and 5.

^j Type is available with a spherical-section faceplate.

^k A maximum voltage value within this range is supplied with each C31024.

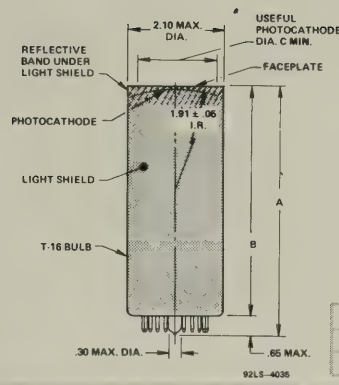
^m Averaged over any interval of 0.1 second.

■ The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.

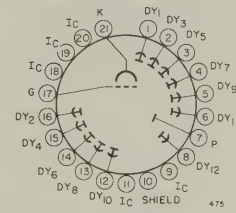


Typical Photocathode Spectral Response Characteristics[■]

8850
8852
C31000N
C31000M



Basing (Bottom View)



8850, 8852 C31000N C31000M

A	5.71 Max.	5.71 Max.	6.43 Max.
B	4.98 ± .08	4.98 ± .08	5.70 ± .08
C	1.80 Min.	1.70 Min.	1.70 Min.

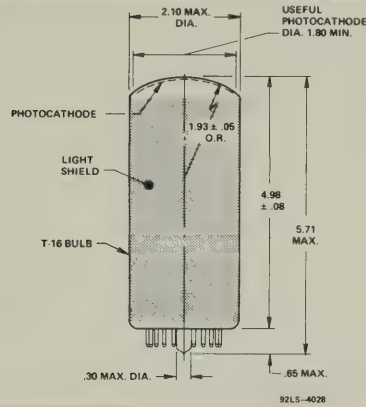
Socket**

RCA♦ — AJ2144
AJ2145
AJ2180

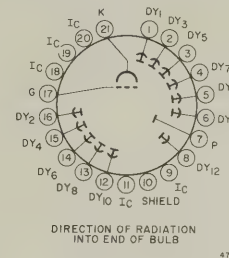
Magnetic Shield**

P — 22P50

8851
8853



Basing (Bottom View)



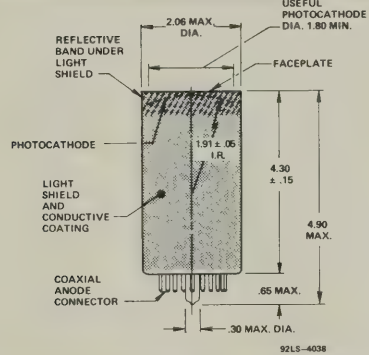
Socket**

RCA♦ — AJ2144
AJ2145
AJ2180

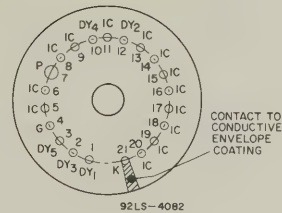
Magnetic Shield**

P — 22P50

C31024



Basing (Bottom View)



Socket**

RCA♦ — AJ2100
AJ2101

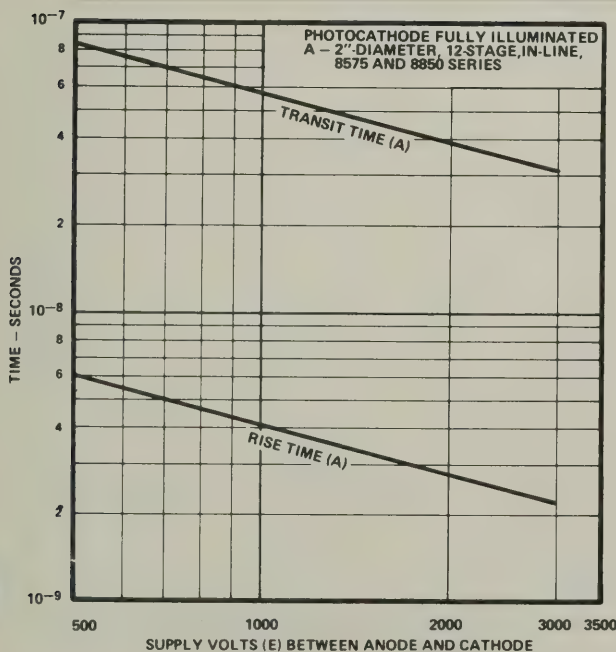
Magnetic Shield**

P — 22P40

Coaxial Anode Cable
RCA♦ — AJ2102

Auxiliary Assemblies

RCA♦ — AJ2175
AJ2203



Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

♦ See pages 12 and 13 for description of these accessories.

Typical Time Response Characteristics for 2"-Diameter,
12-Stage QUANTACON Photomultipliers

2" -Diameter Head-On Types Electrostatic-Focus, In-Line Dynode Structure

Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22° C								
				Supply Voltage V	Average ^b Anode Current mA	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns	
							Radiant ^d		Luminous ^e					
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm				
116	8575	12 I	Be-O	3000	0.2	2000 R	970,000	97	850	85	10	1 @ 200	≤ 2.5	Parent type. A superior tube for pulse counting applications. Has a bi-alkali photocathode.
116	4507	12 I	Be-O	2500	0.2	1500 V	180,000	97	160	85	1.9	0.2 @ 50	≤ 2.5	Variant of 8575 having a spherical section faceplate. Designed for environmental monitoring applications.
113	C31000A	12 I	Be-O	3000	1.0	2000 R	270,000	77	700	200	3.5	5 @ 200	≤ 2.5	Variant of 8575 having a multi-alkali photocathode. Intended for red and near-IR systems.
113	C31000B	12 I	Be-O	3000	1.0	2000 R	270,000	77	700	200	3.5	5 @ 200	≤ 2.5	Variant of C31000A having a spherical-section faceplate.
118	C31000Z ^j	12 I	Be-O	3000	0.2	2000 R	970,000	97	850	85	10	1 @ 200	≤ 2.5	Variant of 8575 having an ultraviolet-transmitting glass window providing a spectral response range from about 200 to 660 nm.
133	C31000AH ^j	12 I	Be-O	3000	0.2	2000 R	970,000	97	850	85	10	1 @ 200	≤ 2.5	Variant of 8575 having a fused-silica window providing a spectral response range from about 180 to 660 nanometers.
139	C31000AJ	12 I	Be-O	2500	0.2	2000 R	64,000	60	85	80	1.2	3 @ 50	≤ 2.5	Variant of 8575 having a high-temperature bi-alkali (Na-K-Sb) photocathode which permits tube operation at temperatures as high as + 150° C.

^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.

^b Averaged over any interval of 30 seconds maximum.

^c For voltage distribution, see page 9.

^d At wavelength of maximum response of the spectral response characteristic.

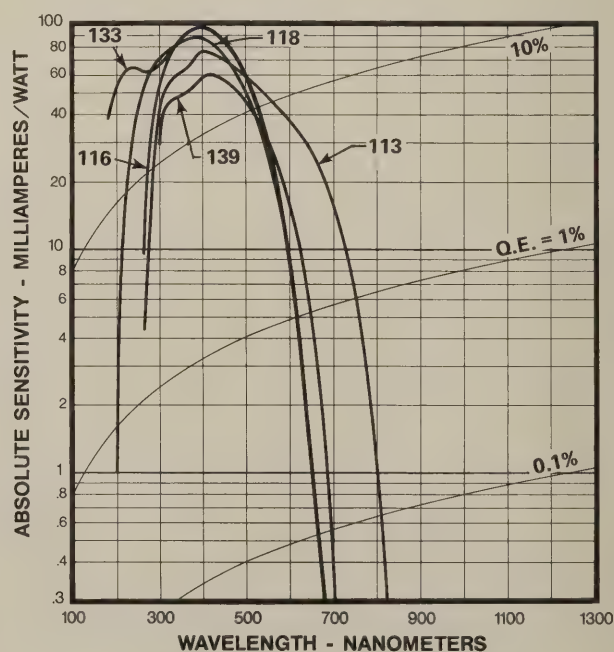
^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.

^f At the maximum rated supply voltage. The photocathode is fully illuminated.

^g See Glossary of Terms, pages 4 and 5.

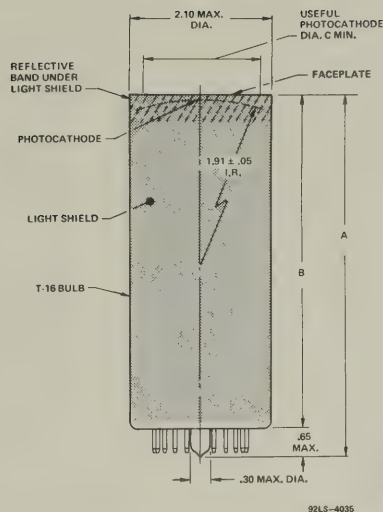
^j Type is available with a spherical-section faceplate.

■ The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.

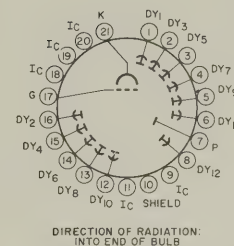


Typical Photocathode Spectral Response Characteristics[■]

8575
C31000A
C31000Z
C31000AJ
C31000AH



Basing (Bottom View)

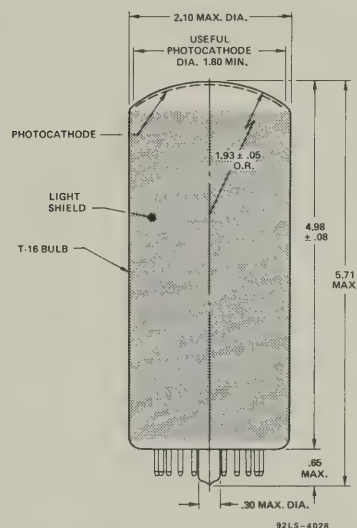


Socket**
RCA♦ — AJ2144
AJ2145
AJ2180

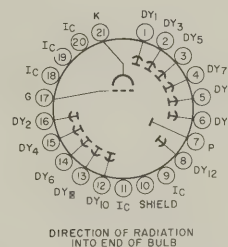
Magnetic Shield**
P — 22P50

8575, C31000A, C31000AJ	C31000Z	C31000AH
A 5.71 Max.	5.71 Max.	6.43 Max.
B 4.98 ± .08	4.98 ± .08	5.70 ± .08
C 1.80 Min.	1.70 Min.	1.70 Min.

4507
C31000B

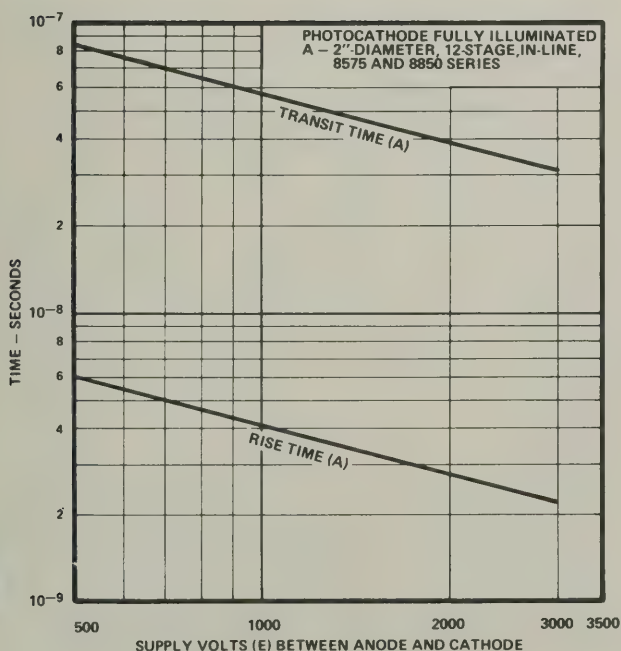


Basing (Bottom View)



Socket**
RCA♦ — AJ2144
AJ2145
AJ2180

Magnetic Shield**
P — 22P50



Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

♦ See pages 12 and 13 for description of these accessories.

Typical Time Response Characteristics for 2"-Diameter,
12-Stage Photomultipliers

RCA Photomultipliers

2" -Diameter Head-On Types Ruggedized and Non-Ruggedized Tubes Venetian-Blind Dynode Structure

Spectral Re- sponse	RCA Type No.	Mechanical		Electrical										Remarks ^g
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C								
				Supply Volt- age V	Average ^b Anode Current mA	Oper- ating Supply Volts and Distri- bution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns	
							Radiant ^d		Luminous ^e					
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm				
107 (S-11)	8053	10 V	Be-O	2000	2.0	1500 D	34,000	56	42	70	0.6	4 @ 9	≤ 10	Parent type. Intended for scintillation counting systems and general appli- cations.
107 (S-11)	2063	10 V	Be-O	2000	2.0	1500 D	—	56	—	70	—	—	≤ 10	Variant of 8053 having semi- flexible leads attached to a temporary base.
110 (S-20)	4463	10 V	Be-O	2500	1.0	2000 D	11,000	68	25	160	0.16	4.8 @ 12	≤ 10	Variant of 8053 having S-20 spectral response. Useful in photometry and flying- spot scanning systems.
115	4523	10 V	Be-O	2500	0.5	1500 D	32,000	71	27	60	0.45	0.5 @ 13	≤ 10	Variant of 8053 having a bi-alkali photocathode. In- tended for scintillation counting systems.
120	8664	10 V	Be-O	2000	2.0	1500 K	18,000	69	17	67	0.25	1 @ 7.5	≤ 10	Features a bi-alkali photo- cathode, sapphire window, and stacked ceramic-to-metal brazed construction. Sample tested for shock and vibra- tion. Design tested for vibration and acceleration. Useful in applications where severe environmental condi- tions exist.
120	8664/V1	10 V	Be-O	2000	2.0	1500 K	18,000	69	17	67	0.25	1 @ 7.5	≤ 10	Variant of the 8664 having an integral crystal holder and voltage-divider network.

^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.

^b Averaged over any interval of 30 seconds maximum.

^c For voltage distribution, see page 9.

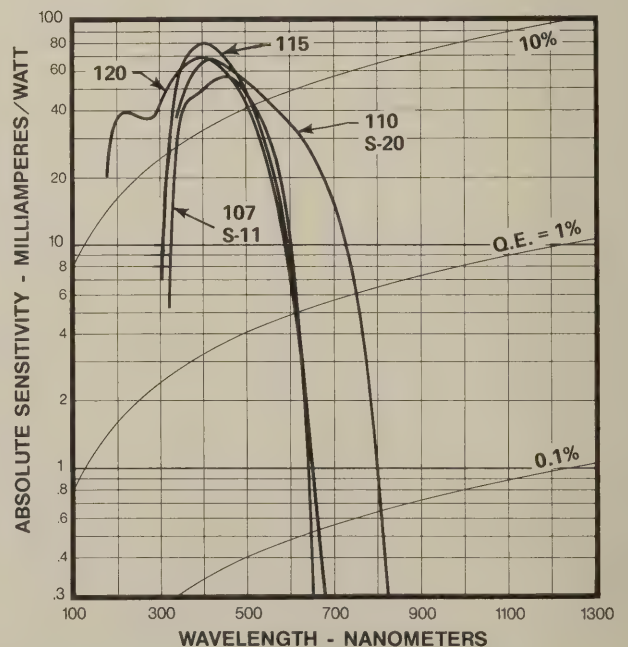
^d At wavelength of maximum response of the spectral response characteristic.

^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.

^f At the maximum rated supply voltage. The photocathode is fully illuminated.

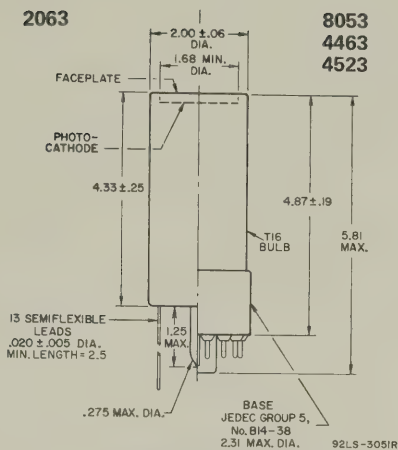
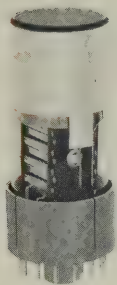
^g See Glossary of Terms, pages 4 and 5.

■ The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.



Typical Photocathode Spectral Response Characteristics[■]

8053
2063*
4463
4523



Basing (Bottom View)
8053, 2063▲
4463, 4523

2063
With temporary
base removed

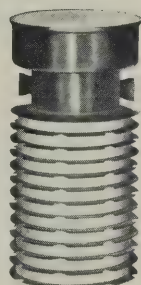
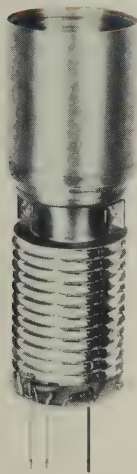
▲ With temporary
base attached

Socket**
C — 3M14
E — 9709-7
L — 2274

Magnetic Shield**
P — 25P50

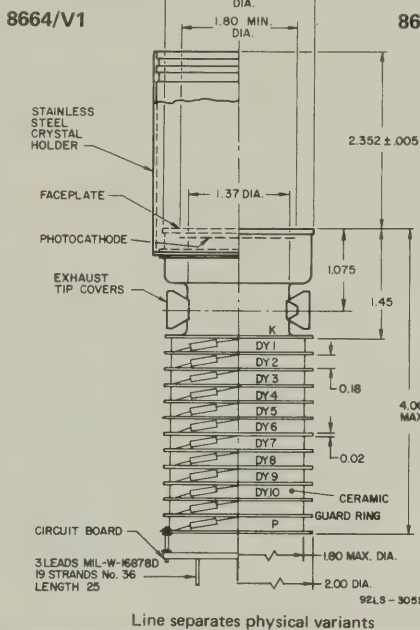
* Type is supplied with a B14-38 base
attached to semiflexible leads.

8664
8664/V1*



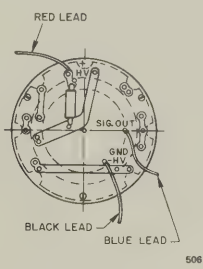
8664/V1

8664



8664

Basing (Bottom View)
8664/V1

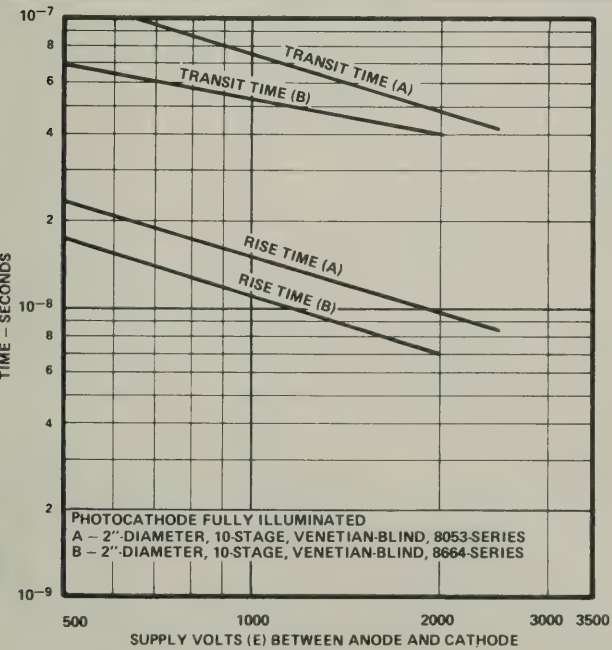


Socket**
8664
Not employed.
Make connections
to flanges.
Magnetic Shield**
8664
P — Foil or tape

Socket**
8664/V1
Type is supplied
with flexible leads.
Magnetic Shield**
8664/V1
P — Foil or tape

* Type has integral voltage divider

Line separates physical variants



Environmental Testing

RCA Type No.	Military Specifica- tion ^a	Quality Conform- ance Inspection ^b	Tests		
			Shock	Vibration	Acceleration
8664 8664/V1	—	Sample	150 ± 15 g's 11 ± 2 ms 6 impact shocks per axis	60 g's 48 to 3000 Hz 15 min total 1 sweep per axis	—
			1500 ± 150 g's 0.20 ± 0.05 ms 6 impact shocks per axis	—	—
		Design	—	60 g's 48 to 3000 Hz 6 hrs total 2 sweeps per axis	150 ± 10 g's 2 min per axis

a None

b Quality Conformance Inspection for ruggedized types:
100% — each tube tested
Sample — some tubes tested
Design — initial production tubes only tested

Dimensions in inches

** For key to socket and shield manufacturers and for
key to terminal connections, see page 11.

Typical Time Response Characteristics for 2"-Diameter,
10-Stage Venetian-Blind Photomultipliers.

RCA Photomultipliers

3" -Diameter Head-On Types Venetian-Blind Dynode Structure

Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C								
				Supply Voltage V	Average ^b Anode Current mA	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns	
							Radiant ^d		Luminous ^e					
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm				
107 (S-11)	8054	10 V	Be-O	2000	2.0	1500 D	35,000	64	43	80	0.54	4 @ 9	≤ 15	Parent type. Intended primarily for use in scintillation counting systems and general-purpose applications.
107 (S-11)	2064B	10 V	Be-O	2000	2.0	1500 D	—	64	—	80	—	—	≤ 15	Variant of 8054 having semiflexible leads attached to a temporary base.
110 (S-20)	4464	10 V	Be-O	2500	1.0	2000 D	11,000	68	25	160	0.16	4.8 @ 12	≤ 15	Variant of 8054 having S-20 response.
115	4524	10 V	Be-O	2500	0.5	1500 D	32,000	71	27	60	0.45	1 @ 13	≤ 15	Variant of 8054 having a bialkali photocathode. Intended for scintillation counting applications.
122	4521	10 V	Be-O	2000	0.5	1500 K	19,000	87	18	83	0.22	2 @ 7.5	≤ 15	Variant of 8054 having a bialkali photocathode, an aluminum-oxide window, and a metal envelope. Tube structure provides a minimum of radioactive background. Intended for nuclear particle detection and gamma-ray spectroscopy.

^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.

^b Averaged over any interval of 30 seconds maximum.

^c For voltage distribution, see page 9.

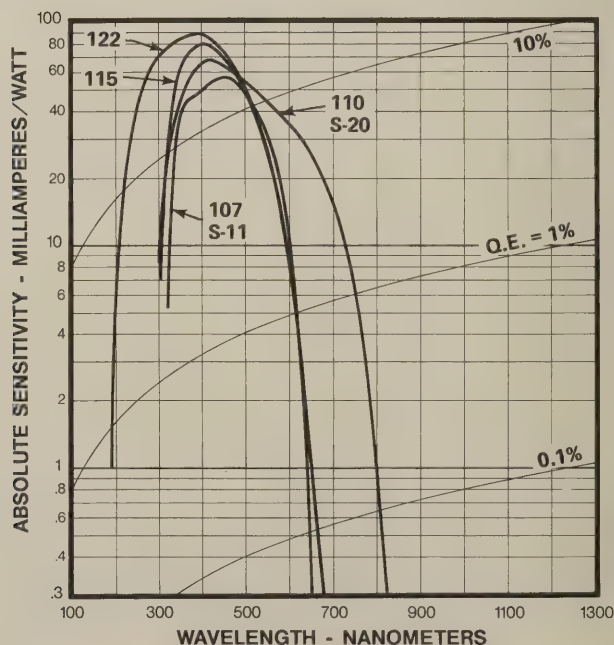
^d At wavelength of maximum response of the spectral response characteristic.

^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.

^f At the maximum rated supply voltage. The photocathode is fully illuminated.

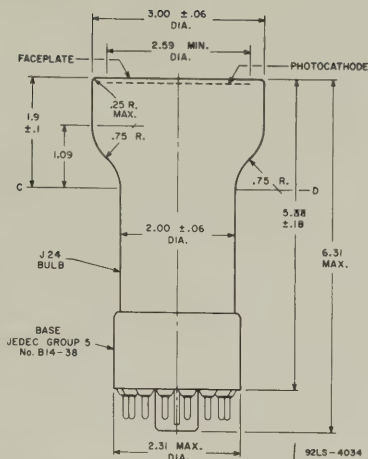
^g See Glossary of Terms, pages 4 and 5.

■ The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.

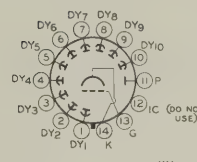


Typical Photocathode Spectral Response Characteristics[■]

8054
4524



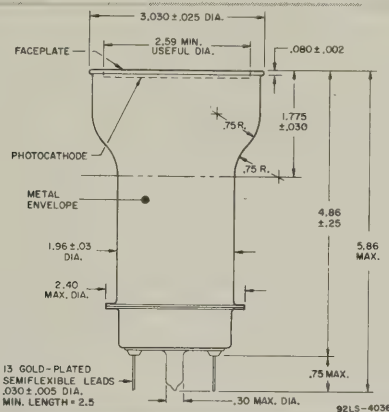
Basing (Bottom View)



Socket**
AM - 59-417
C - 3M14
E - 9709-7
L - 2274

Magnetic Shield**
P - 23P55X32

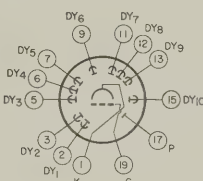
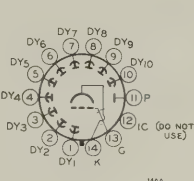
4521*



Basing (Bottom View)

With temporary base attached

With temporary base removed



Socket**
AM - 59-417
C - 3M14
E - 9709-7
L - 2274

Magnetic Shield**
P - Foil or tape

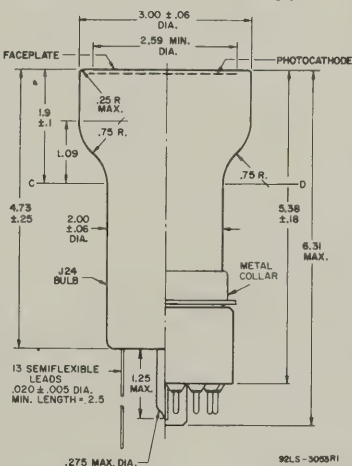
* Type is supplied with a B14-45 base attached to semiflexible leads.

2064B*
4464

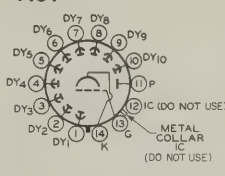


2064B

4464



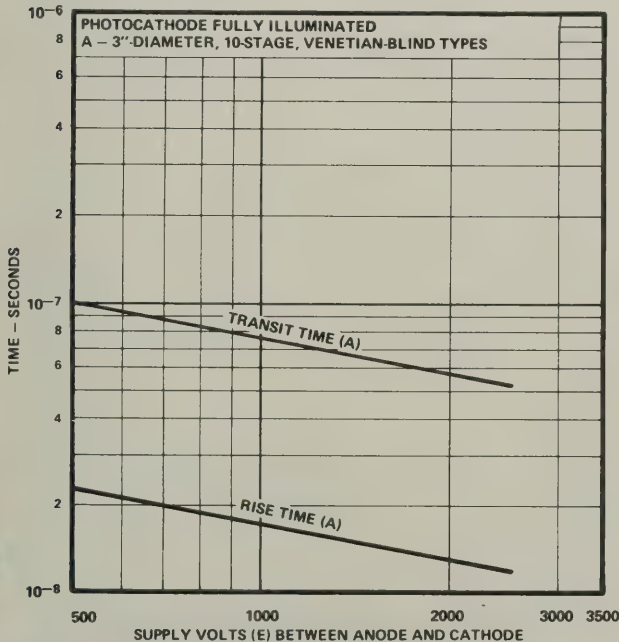
Basing (Bottom View)
4464



Socket**
AM - 59-417
C - 3M14
E - 9709-7
L - 2274

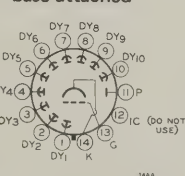
Magnetic Shield**
4464 - P - 35P70
2064B - P - Foil or tape

* Type is supplied with a B14-38 base attached to semiflexible leads.

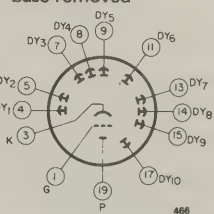


Basing (Bottom View)
2064B

With temporary base attached



With temporary base removed



Line separates physical variants

Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

Typical Time Response Characteristics for 3"-Diameter, 10-Stage Venetian-Blind Photomultipliers

3" -Diameter Ruggedized Head-On Types Venetian-Blind Dynode Structure

Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C								
				Supply Voltage V	Average ^b Anode Current mA	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) × 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns	
							Radiant ^d		Luminous ^e					
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm				
120	C31009	10 V	Be-O	2000	2.0	1500 K	17,000	77	17	75	0.22	1 @ 7.5	≤ 15	Parent type. Ruggedized tube having a bialkali photocathode, a 2-mm thick sapphire window, and stacked ceramic-to-metal brazed construction. Kovar metal used in envelope. Is design tested for shock and vibration. Intended for general scintillation counting applications.
120	C31009B	10 V	Be-O	2000	2.0	1500 K	17,000	77	17	75	0.22	1 @ 7.5	≤ 15	Variant of C31009 using non-ferro-magnetic material in the envelope.
120	C31009A	10 V	Be-O	2000	2.0	1500 K	17,000	77	17	75	0.22	1 @ 7.5	≤ 15	Variant of C31009 having a 1 mm-thick sapphire window. Designed for the detection of Cerenkov radiation.
120	C31009C	10 V	Be-O	2000	2.0	1500 K	17,000	77	17	75	0.22	1 @ 7.5	≤ 15	Variant of C31009A using non-ferro-magnetic material in the envelope.
120	C31012	10 V	Be-O	2000	2.0	1500 K	17,000	77	17	75	0.22	1 @ 7.5	≤ 15	Similar to the C31009 except has tabs on flanges rather than notches. Has a 2-mm thick sapphire window and a structure providing a minimum of radioactive background. Intended for nuclear particle detection and gamma-ray spectrophotometry.
120	C31012B	10 V	Be-O	2000	2.0	1500 K	17,000	77	17	75	0.22	1 @ 7.5	≤ 15	Variant of C31012 using non-ferro-magnetic material in the envelope.
120	C31012A	10 V	Be-O	2000	2.0	1500 K	17,000	77	17	75	0.22	1 @ 7.5	≤ 15	Variant of C31012 having a 1 mm thick sapphire window. Designed for the detection of Cerenkov radiation.
120	C31012C	10 V	Be-O	2000	2.0	1500 K	17,000	77	17	75	0.22	1 @ 7.5	≤ 15	Variant of C31012A using non-ferro-magnetic material in the envelope.

^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.

^b Averaged over any interval of 30 seconds maximum.

^c For voltage distribution, see page 9.

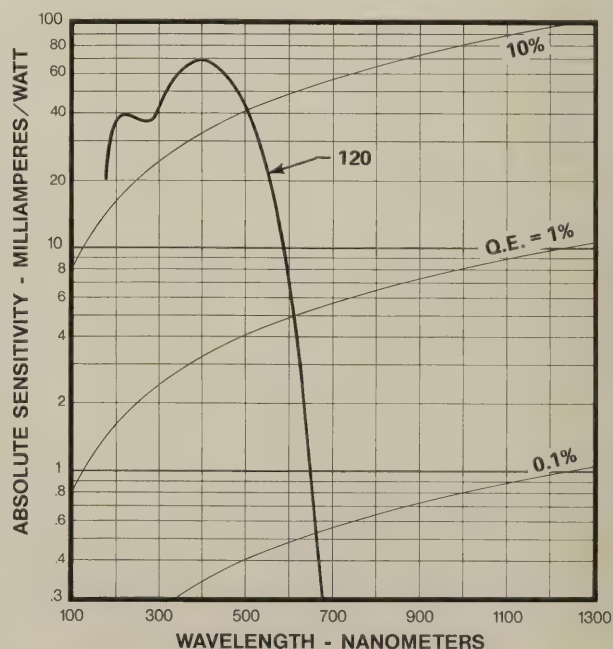
^d At wavelength of maximum response of the spectral response characteristic.

^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.

^f At the maximum rated supply voltage. The photocathode is fully illuminated.

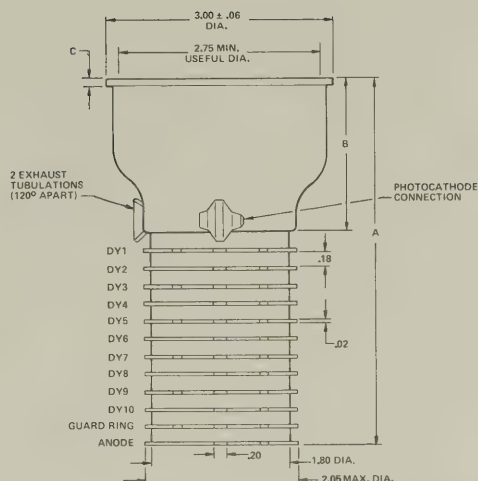
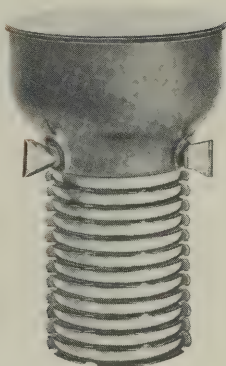
^g See Glossary of Terms, pages 4 and 5.

■ The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.



Typical Photocathode Spectral Response Characteristics[■]

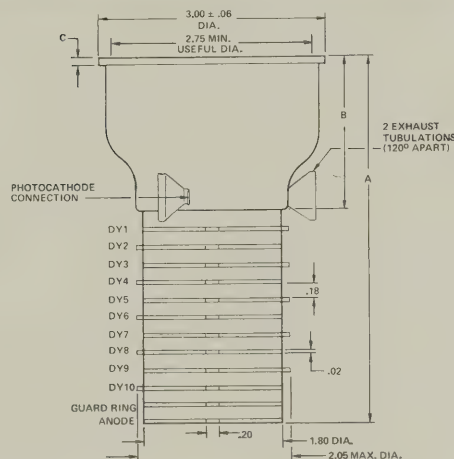
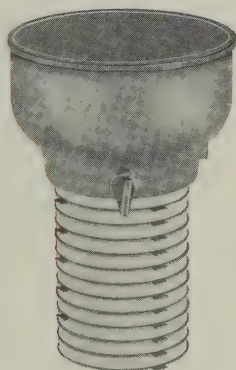
C31009
C31009B
C31009A
C31009C



92LS-4032

	C31009	C31009B	C31009A	C31009C
A	4.50 Max.	4.55 Max.	4.82 Max.	4.87 Max.
B	1.88	1.88	2.28	2.30
C	0.08	0.08	0.39	0.39

C31012
C31012B
C31012A
C31012C



92LS-4031

	C31012	C31012B	C31012A	C31012C
A	4.50 Max.	4.55 Max.	4.82 Max.	4.87 Max.
B	1.96	1.98	2.28	2.30
C	0.08	0.08	0.39	0.39

Socket**
 Not employed.
 Make electrical connections to flange indentations.

Magnetic Shield**
 P — Foil or tape

Socket**
 Not employed.
 Make electrical connections to flange tabs.

Magnetic Shield**
 P — Foil or tape

Environmental Testing

RCA Type No.

Military Specification^a

Quality Conformance Inspection^b

Tests

Shock

Vibration

Acceleration

C31009
 C31009A
 C31009B
 C31009C
 C31012
 C31012A
 C31012B
 C31012C

—

Design

150 ± 15 g's
 11 ± 2 ms
 2 impact shocks per axis

60 g's
 48 to 3000 Hz
 6 hrs total
 2 sweeps per axis

150 ± 10 g's
 2 min per axis

1500 ± 150 g's
 0.20 ± 0.05 ms
 2 impact shocks per axis

—

—

^a None

^b Quality Conformance Inspection for ruggedized types:
 100% — each tube tested
 Sample — some tubes tested
 Design — initial production tubes only tested

Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

RCA Photomultipliers

5" -Diameter Head-On Types

In-Line Electrostatic-Focus and Venetian-Blind Dynode Structure

Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g	
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings		Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C									
				Supply Voltage V	Average ^b Anode Current mA	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns		
							Radiant ^d		Luminous ^e						
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μ A/lm					
118	4522	14 I	Be-O	3000	0.5	2000 X	2,600,000	88	2300	77	30	60 @ 2000	≤ 3	Parent type. Electrostatic-focus type having bialkali photocathode. Designed for nuclear physics applications where a high degree of time definition required.	
118	8854	14 I	Dy1-GaP Dy2-Dy14 Be-O	3000	0.5	2000 X	3,500,000	88	3100	77	40	60 @ 2000	≤ 3	QUANTACON. Variant of 4522 having a GaP first dynode. A superior 5"-diameter tube for nuclear physics.	
107 (S-11)	8055	10 V	Be-O	2000	2.0	1500 D	35,000	88	44	110	0.4	4 @ 9	≤ 20	Parent type. Intended for scintillation counting systems and general applications.	
107 (S-11)	2065	10 V	Be-O	2000	2.0	1500 D	—	88	—	110	—	—	≤ 20	Variant of 8055 having semi-flexible leads attached to a temporary base.	
115	4525	10 V	Be-O	2500	0.5	1500 D	32,000	80	27	67	0.4	1.5 @ 13	≤ 20	Variant of 8055 having a bialkali photocathode. Intended for scintillation counting applications.	
110 (S-20)	4465	10 V	Be-O	2500	1.0	2000 D	11,000	68	25	160	0.16	4.8 @ 12	≤ 20	S-20 variant of 8055. Especially useful for photometry and flying spot scanning.	

^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.

^b Averaged over any interval of 30 seconds maximum.

^c For voltage distribution, see page 9.

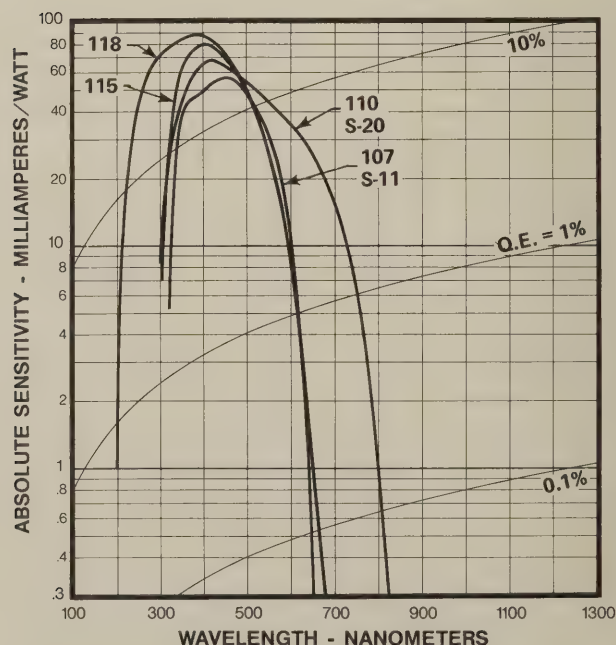
^d At wavelength of maximum response of the spectral response characteristic.

^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.

^f At the maximum rated supply voltage. The photocathode is fully illuminated.

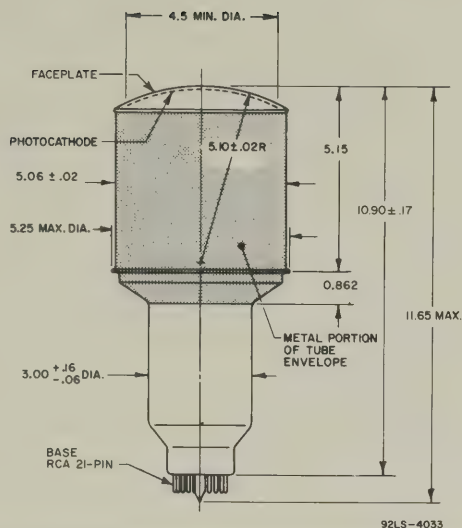
^g See Glossary of Terms, pages 4 and 5.

^h The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.

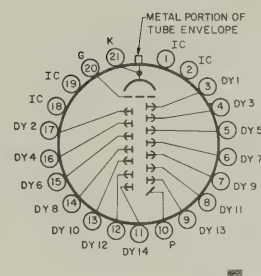


Typical Photocathode Spectral Response Characteristics^h

4522
8854



Basing (Bottom View)



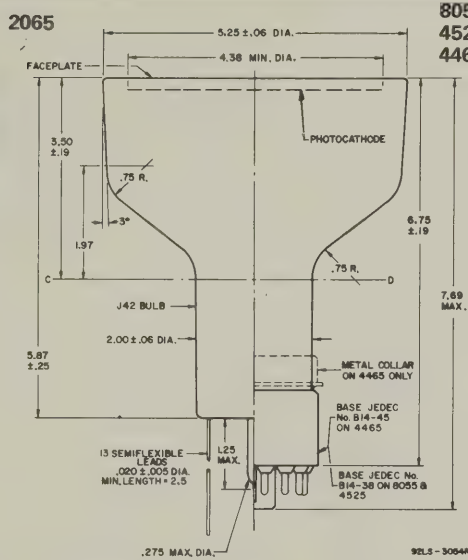
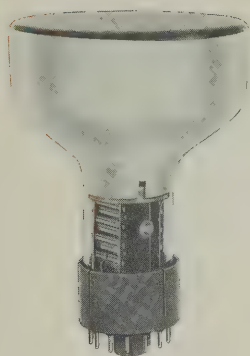
Socket**

RCA♦ - AJ2144
AJ2145
AJ2180

Magnetic Shield**

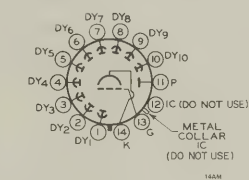
P - 32P100X55

8055
2065*
4525
4465



Basing (Bottom View)

4465



Socket**

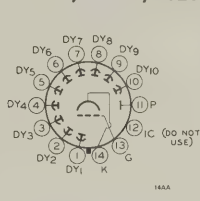
C - 3M14
E - 9709-7
L - 2274

Magnetic Shield**

8055, 2065, 4525
M - 80805M
P - 23P68X57
4465
P - 30P67X57

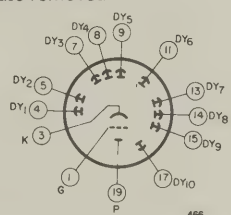
Basing (Bottom View)

8055, 2065▲, 4525



▲ With temporary base attached

2065
With temporary base removed



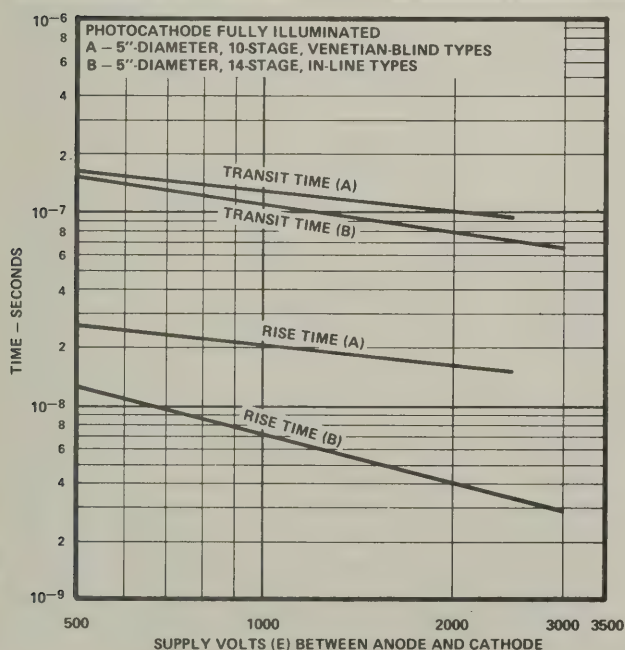
* Type is supplied with a B14-38 base attached to semiflexible leads.

Line separates physical variants

Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

♦ See pages 12 and 13 for description on these accessories.



Typical Time Response Characteristics for 5''-Diameter, 10-Stage Photomultipliers

RCA Photomultipliers

5" -Diameter Ruggedized Head-On Types Venetian-Blind Dynode Structure

Spectral Response	RCA Type No.	Mechanical		Electrical										Remarks ^g			
		No. of Stages and Cage Structure ^a	Dynode Secondary Emitting Surface Material	Maximum Ratings			Typical Characteristics at specified operating supply voltage, voltage distribution, and 22°C										
				Supply Voltage V	Average ^b Anode Current mA	Operating Supply Volts and Distribution ^c	Sensitivity				Gain (Approx.) x 10 ⁶	Anode Dark Current nA@ Anode Luminous Sensitivity A/lm	Anode Pulse Rise Time ^f ns				
							Radiant ^d		Luminous ^e								
							Anode A/W	Cathode mA/W	Anode A/lm	Cathode μA/lm							
115	C31027	10 V	Be-O	2000	0.5	1500 K	13,000	88	11.5	77	0.15	2 @ 0.9 ⁿ	≤ 20	Parent type. Ruggedized tube having a bialkali photocathode and a stacked ceramic-to-metal brazed structure. Design tested for shock and vibration.			
115	C31029	12 V	Be-O	2500	0.5	1750 U	130,000	88	115	77	1.5	20 @ 9 ⁿ	≤ 20	Variant of C31027 having 12 stages.			

^a Cage Structure: C, circular-cage; I, in-line; and V, venetian-blind.

^b Averaged over any interval of 30 seconds maximum.

^c For voltage distribution, see page 9.

^d At wavelength of maximum response of the spectral response characteristic.

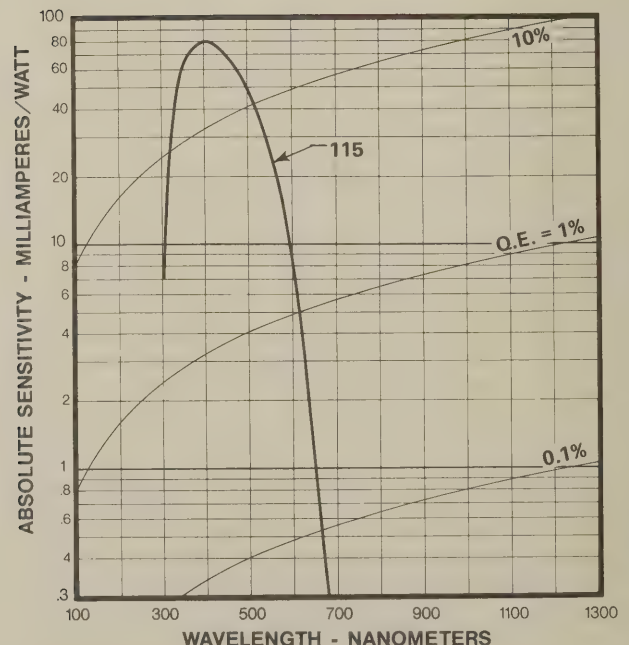
^e With a tungsten-filament lamp operated at a color temperature of 2870°K. Future data for RCA photomultipliers will be measured using a color temperature of 2854°K.

^f At the maximum rated supply voltage. The photocathode is fully illuminated.

^g See Glossary of Terms, pages 4 and 5.

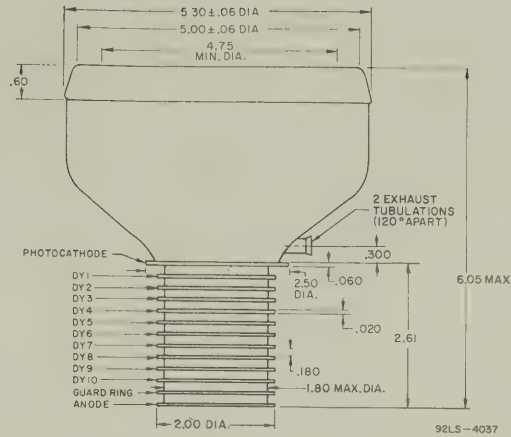
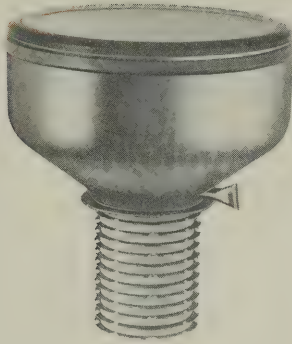
ⁿ The values 0.9 and 9 are the ratios of the anode current by the light flux that is incident on a Corning C. S. No. 5-58 filter (1/2 stock thickness). The filter is interposed between a 2870°K light source and the tube.

■ The values of radiant sensitivity shown in the graph for each spectral response designation are typical and may or may not apply for the tube types shown on this page. See page 82 for method of obtaining sensitivities, at any wavelength, for any given tube.



Typical Photocathode Spectral Response Characteristics[■]

C31027



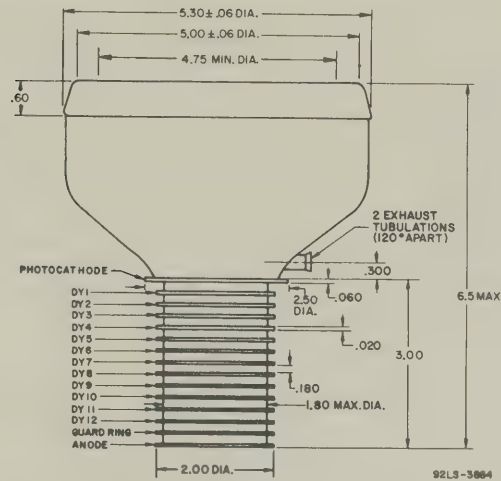
Socket**

Not employed.
Make electrical
connection to
flanges.

Magnetic Shield**

P — Foil or tape

C31029



Socket**

Not employed.
Make electrical
connection to
flanges.

Magnetic Shield**

P — Foil or tape

Environmental Testing

RCA Type No.

Military Specification^a

Quality Conformance Inspection^b

Tests

Shock

Vibration

Acceleration

C31027
C31029

Design

150 g's
11 ms
1500 g's
0.20 ms

60 g's
48 to 3000 Hz

—

—

^a None

^b Quality Conformance Inspection for ruggedized types:
100% — each tube tested
Sample — some tubes tested
Design — initial production tubes only tested

Dimensions in inches

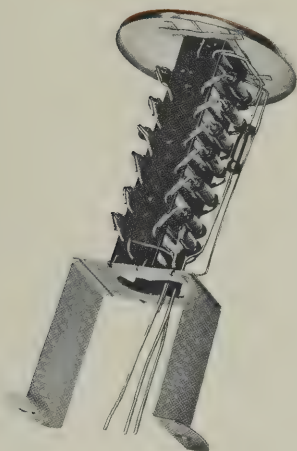
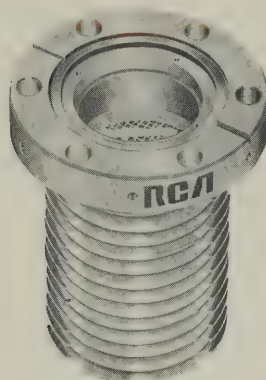
** For key to socket and shield manufacturers and for
key to terminal connections, see page 11.

RCA Electron Multipliers

Electron multiplier structures are identical to those used in photomultiplier tubes. Electron multipliers are intended for use in vacuum systems in the detection and measurement of electrons, ions and other charged particles, as well as X-radiation and vacuum ultraviolet radiation. The maximum average anode current (30 second average) for all structures listed in the chart below is 10 microamperes.

- For Particle and Radiation Detection
- For Use in a Vacuum System of 10^{-5} Torr, or Lower
- Broad Selection of Mechanical and Electrical Characteristics
- Various Types Feature an Integral Voltage Divider
- High Stability Copper-Beryllium Dynodes

RCA Dev. Type No.	Out-line, Bas-ing Dia-gram	RCA Photomultiplier Tube With Similar Dynode Structure	Cage Structure (CuBe Dynodes)	Number of Dynodes	Outer Structure	Radiation Opening Inches	TYPICAL VALUES	
							Voltage, Anode to Dynode No. 1, Volts (equal volts per stage)	Current Amplifica-tion at Typical Conditions
C7075D	1	931A	Circular Cage	10	11 flexible leads sealed in bulb	.31 x .94	2000-3000	1×10^5
C7187J	2	6810A	In-Line	14	Glass stem, (19) flexible leads (B20-102 base supplied)	$.375 \pm .010 \times .375 \pm .010$	3000-4000	$1 \text{ to } 10 \times 10^6$
C7187K	2	6810A	In-Line	14	Flange, glass stem, (19) flexible leads (B20-102 base supplied)	$.375 \pm .010 \times .375 \pm .010$	3000-4000	$1 \text{ to } 10 \times 10^6$
C31017	4	8664	Venetian Blind	14	Stacked ceramic and Kovar construction, ring terminals, flange mounting, shipped with sealed flange	.900 x .730	3000-4000	$1 \text{ to } 10 \times 10^6$
C31017A	4	8664	Venetian Blind	10	Same as C31017 above	.900 x .730	2500-3500	$1 \text{ to } 10 \times 10^5$
C31017B	4	8664	Venetian Blind	10	Stacked ceramic and non-magnetic material construction, ring terminals, flange mounting	.900 x .730	2500-3500	$1 \text{ to } 10 \times 10^5$
C31017C	4	8664	Venetian Blind	10	Stacked ceramic and Kovar construction, ring terminals, flange mounting	.900 x .730	2500-3500	$1 \text{ to } 10 \times 10^5$
C31019	3	4460	In-Line	14	Kovar flange, glass stem, (16) flexible leads, shipped in plastic bag	$.250 \pm .005 \text{ D.}$	3900-4500	5×10^5
C31019A	8	4460	In-Line	14	Glass stem, (16) flexible leads, unsealed in bulb	$.250 \pm .005 \text{ D.}$	3900-4500	5×10^5

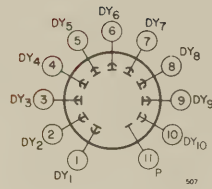
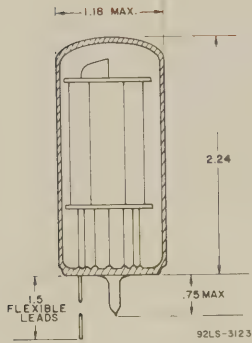
C31019B
C31017
C31017A
C31017B
C31017C
**C7075D**

RCA Dev. Type No.	Out- line, Bas- ing Dia- gram	RCA Photomul- tipplier Tube With Similar Dynode Structure	Cage Structure (CuBe Dynodes)	Number of Dynodes	Outer Structure	Radiation Opening Inches	TYPICAL VALUES	
							Voltage, Anode to Dynode No. 1, Volts (equal volts per stage)	Current Amplifica- tion at Typical Conditions
C31019B	5	4460	In-Line	14	Support brackets, integral divider, (3) flexible leads, shipped in plastic bag	.250 ± .005 D.	3900-4500	5 × 10 ⁵
C31019C	6	4460	In-Line	10	Integral divider, (3) flexible leads, shipped in plastic bag	.250 ± .005 D.	3000-3500	1 × 10 ⁵
C31021	3	4460	In-Line	12	Kovar flange, glass stem, (14) flexible leads, shipped in plastic bag	.250 ± .005 D.	3400-4000	2.5 × 10 ⁵
C31021A	8	4460	In-Line	12	Glass stem, (14) flexible leads, shipped unsealed in bulb	.250 ± .005 D.	3400-4000	2.5 × 10 ⁵
C70102F	8	4460	In-Line	10	Glass stem, (12) flexible leads, shipped sealed in bulb	.250 ± .005 D.	3000-3500	1 × 10 ⁵
C70102H	3	4460	In-Line	10	Kovar flange, glass stem, (12) flexible leads, shipped in plastic bag	.250 ± .005 D.	3000-3500	1 × 10 ⁵
C70102K	8	4460	In-Line	10	Glass stem, (12) flexible leads, shipped unsealed in bulb	.250 ± .005 D.	3000-3500	1 to 5 × 10 ⁵
C70120E	7	8053	Venetian Blind	14	(16) rod terminals, shipped in plastic bag	.800 ± .010 D.	3000-4000	1 to 10 × 10 ⁶
C70129D	9	8571	Circular Cage	10	Glass stem, (11) flexible leads, shipped unsealed in bulb	.06 × .375	2000-3000	1 × 10 ⁵
C70131	10	7850	In-Line	14	(15) rod terminals, shipped in plastic bag	.375 ± .005 D.	3000-4000	2.5 × 10 ⁵

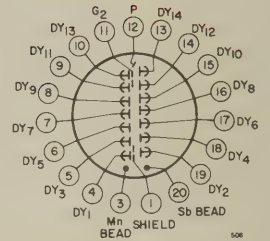
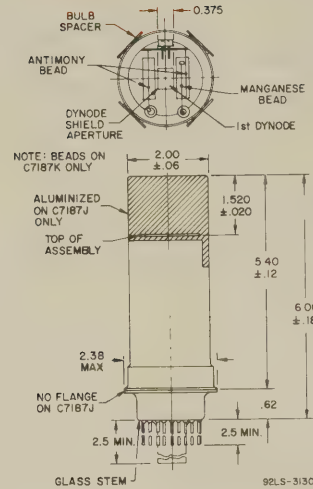
RCA Electron Multipliers

Dimensional Outlines

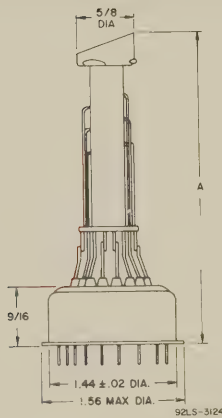
1. C7075D



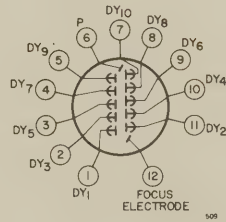
2. C7187J C7187K



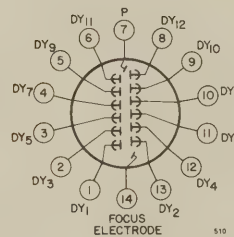
3. C70102H C31021 C31019



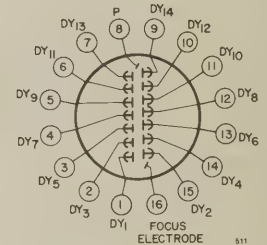
C70102H



C31021

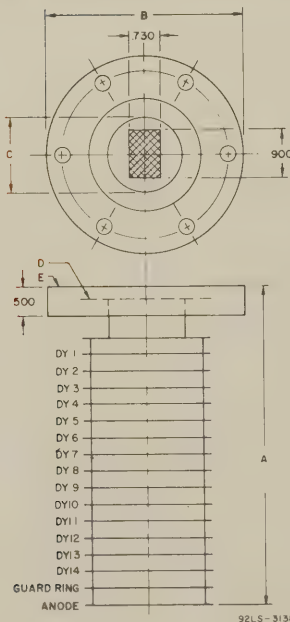


C31019



	C70102H	C31021	C31019
A	3.000 ± .005	3.300 ± .005	3.600 ± .005

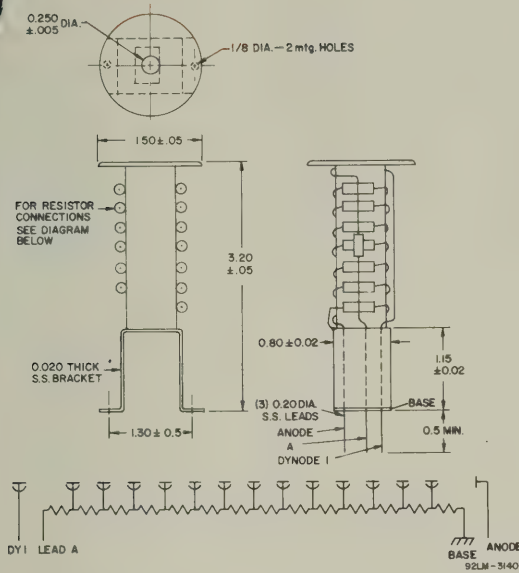
4. C31017 C31017A C31017B C31017C



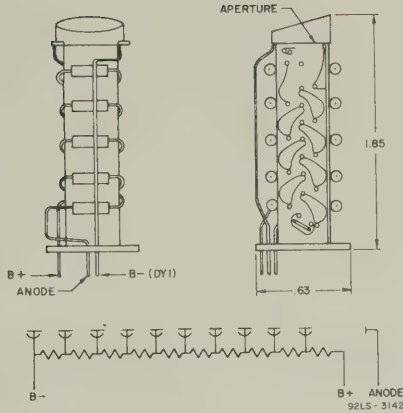
	A	B	C	Flange
C31017	4.01	2.75	1.27	E
C31017A	3.75	2.75	1.27	E
C31017B	3.25	2.00	1.31	D
C31017C	3.25	2.00	1.31	D

Note: Types C31017A, C31017B, and C31017C have 10 dynodes

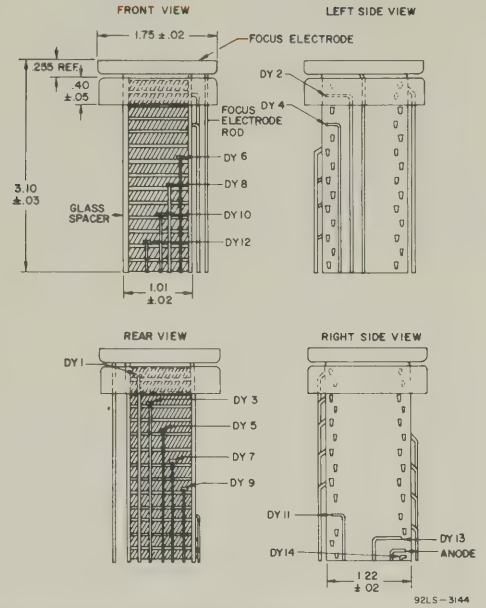
5. C31019B



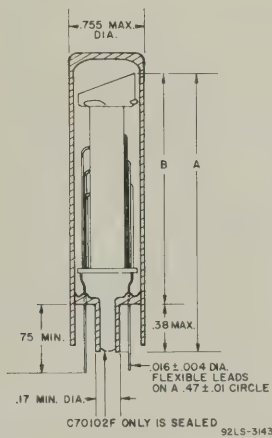
6. C31019C



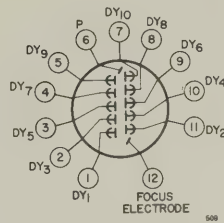
7. C70120E



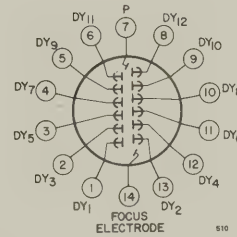
8. C70102F C70102K C31021A C31019A



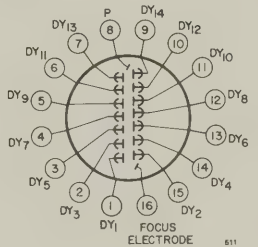
C70102F C70102K



C31021A

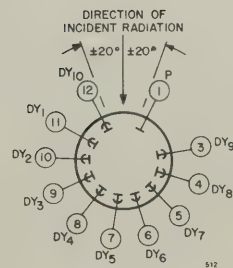
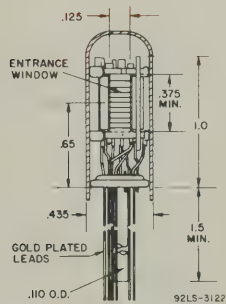


C31019A

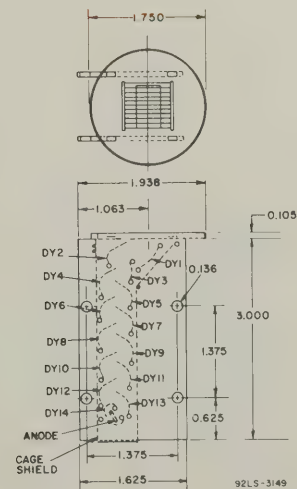


	C70102F,K	C31021A	C31019A
A	2.31 Max.	2.61 Max.	2.91 Max.
B	1.93 ± 0.06 -0.12	2.24 ± 0.06 -0.12	2.53 ± 0.06 -0.12

9. C70129D



10. C70131



RCA Photodiodes

Gas-Filled Types



920



927



1P29



1P41

Type	Out-line, Bas-ing Dia-gram	Spec-tral Re-sponse	Inter-elec-trode Capac-ittance pF	Maximum Ratings					Characteristics at 22° C							Cathode Material
				Anode Supply Voltage DC or peak AC V	Average Cathode Current Density $\mu\text{A}/\text{in}^2$	Average Cathode Current ^a μA	Amb-ient Temp. °C	Anode Supply Voltage V DC	Luminous Sensitivity at 2870° K $\mu\text{A}/\text{lm}$			Max. Gas Amp-lifica-tion Fac-tor	Max. Anode Dark Current μA	Win-dow ^b Ma-terial		
									Min.	Typ.	Max.					

Side-On Types

1P29	6	S-3	3.0	100	25 ^c	5 ^c	100	90	20	40	75	9.0	0.1	0080	Ag-O-Rb
1P37	6	S-4	3.0	100	25 ^c	5 ^c	75	90	75	135	250	5.5	0.05	0080	Cs-Sb
1P40	7	S-1	2.4	90	30 ^d	3 ^d	100	90	90	135	250	10.0	—	0080	Ag-O-Cs
868	6	S-1	3.0	100	25 ^c	5 ^c	100	90	50	90	170	8.0	0.1	0080	Ag-O-Cs
918	6	S-1	3.0	90	25 ^d	5 ^d	100	90	120	150	250	10.5	0.1	0080	Ag-O-Cs
923	3	S-1	2.0	90	30 ^d	3 ^d	100	90	75	135	250	10.0	0.1	0080	Ag-O-Cs
927	2	S-1	2.0	90	30 ^d	2 ^d	100	90	75	125	205	10.0	0.1	R6	Ag-O-Cs
930	7	S-1	2.4	90	30 ^d	3 ^d	100	90	90	135	250	10.0	0.1	0080	Ag-O-Cs
4409	7	S-4	2.4	100	30 ^c	3 ^c	75	90	75	135	205	5.5	0.05	0080	Cs-Sb
5581	7	S-4	2.6	100	30 ^c	3 ^c	75	90	75	135	250	5.5	0.05	0080	Cs-Sb
5583	2	S-4	2.0	100	20 ^c	2 ^c	75	90	75	135	250	5.5	0.05	R6	Cs-Sb
6405/1640	5	S-1	2.6	90	25 ^d	5 ^d	100	50	17.5	35	70	2.5	0.1	0080	Ag-O-Cs
6953	7	S-1	3.0	90	30 ^d	3 ^d	100	90	140	200	350	10.0	0.1	0080	Ag-O-Cs

Side-On Cartridge Types

921	8	S-1	1.0	90	30 ^d	3 ^d	100	90	75	135	250	10.0	—	0080	Ag-O-Cs
5582	8	S-4	2.2	100	20 ^c	2 ^c	75	90	80	120	250	5.5	0.05	0080	Cs-Sb

Side-On Twin-Unit Types

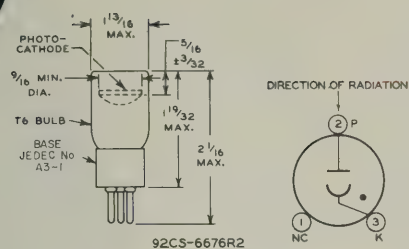
920	4	S-1	1.6 ^e	90	15 ^d	2 (each unit)	100	90	50	100	200	9.0	0.1	0080	Ag-O-Cs
-----	---	-----	------------------	----	-----------------	---------------	-----	----	----	-----	-----	-----	-----	------	---------

Head-On Types

1P41	1	S-1	1.8	90	20 ^d	1.5 ^d	100	90	50	90	167	8.5	0.1	R6	Ag-O-Cs
------	---	-----	-----	----	-----------------	------------------	-----	----	----	----	-----	-----	-----	----	---------

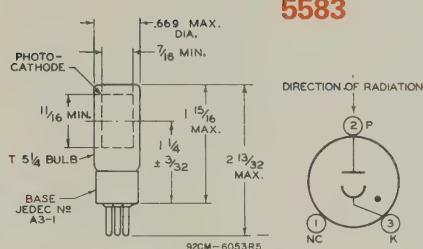
- ^a Averaged over any interval of 30 seconds maximum.
^b Window Material: 0080, Corning Lime Glass; R6, Kimble Standard Flint.
^c May be doubled when anode supply voltage is limited to 80 volts.
^d May be doubled when anode supply voltage is limited to 70 volts.
^e Cathode-to-anode, each unit, with the other unit grounded.

1P41



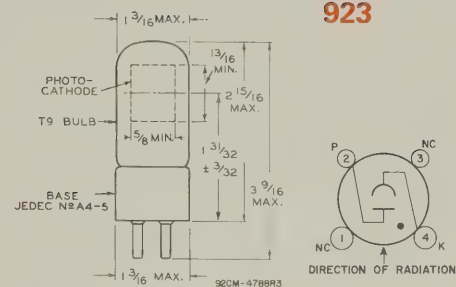
2

927
5583



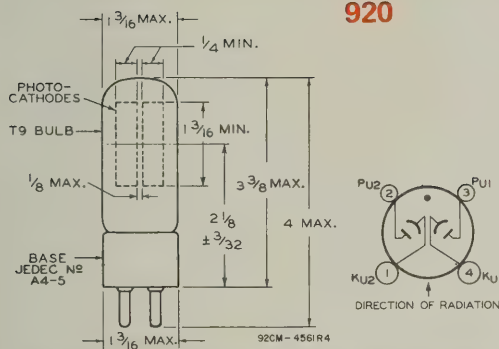
3

923



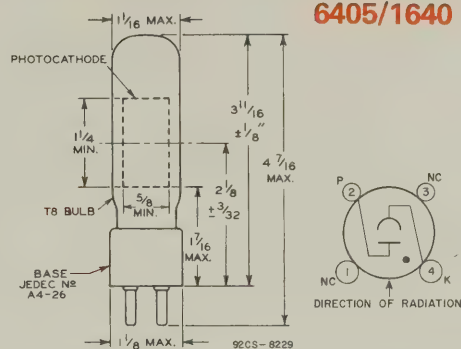
4

920



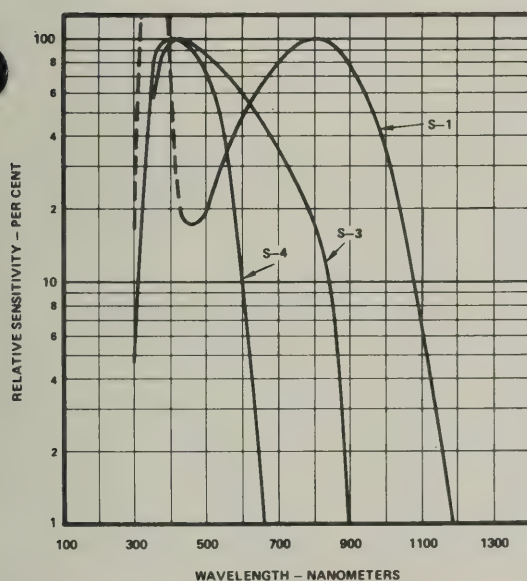
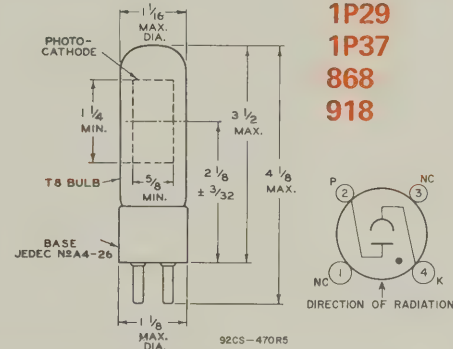
5

6405/1640



6

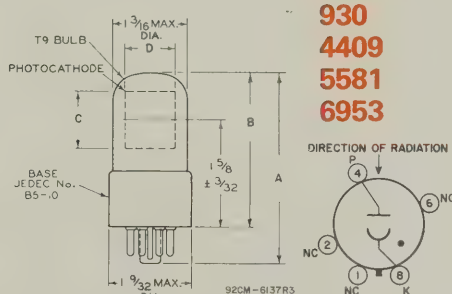
1P29
1P37
868
918



Typical Photocathode Spectral Response Characteristics

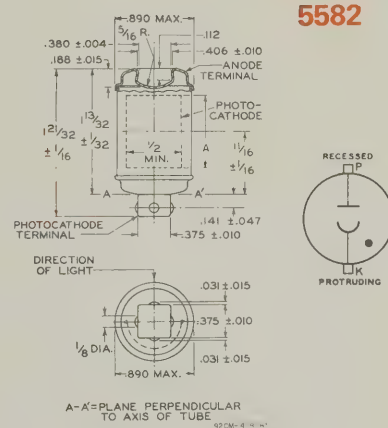
7

1P40
930
4409
5581
6953



8

921
5582



	1P40, 930, 5581	4409, 6953
A	3-1/16" Max.	3-3/16" Max.
B	2-1/2" Max.	2-5/8" Max.
C	13/16" Min.	23/32" Min.
D	5/8" Min.	9/16" Min.

921 **5582**
A **7/8" Min.** **5/8" Min.**

Base JEDEC No.	Socket
A4-26	AM-77MIP4T
	C - 2154
	L - 2093

Base JEDEC No.	Socket
B5-10	AM — 77MIP8T
	C — 9875
	E — 9729-127
	L — 1935

Base JEDEC No.	Socket
A3-1	AM — 78S3S
A4-5	L — 2093
Special (Cartridge) 921, 5582	AL — 446PC

Dimensions in inches

****** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

RCA Photodiodes

Vacuum Types



917



5652



935



1P42



922

Maximum Ratings										Characteristics at 22° C					Max. Anode Dark Current μ A	Window ^b Material	Cathode Material
Type	Out- line, Bas- ing Dia- gram	Spectral Re- sponse	Inter- elec- trode Capac- itance pF	Anode Supply Voltage DC or peak AC V	Average Cathode- Current Density μ A/in ²	Average Cathode- Current ^a μ A	Ambient Temper- ature- $^{\circ}$ C	Anode Supply Voltage V DC	Luminous Sensitivity at 2870° K μ A/lm								
										Min.	Typ.	Max.					

Side-On Types

1P39	1	S-4	2.6	250	25	8	75	250	25	52	100	0.005	0080	Cs-Sb
917 ^c	9	S-1	1.6	500	30	10	100	250	12	20	50	0.005	0080	Ag-O-Cs
919 ^c	9	S-1	2.0	500	30	10	100	250	12	20	50	0.005	0080	Ag-O-Cs
925	3	S-1	1.6	250	30	5	100	250	12	20	40	0.0125	0080	Ag-O-Cs
929	1	S-4	2.6	250	25	5	75	250	25	52	100	0.0125	0080	Cs-Sb
934	5	S-4	1.5	250	30	4	75	250	19	30	75	0.005	R6	Cs-Sb
935	7	S-5	0.6	250	30	10	75	250	18	35	70	0.0005	9741	Cs-Sb
2022	3	S-1	1.6	250	30	5	100	250	12	20	40	0.0125	0080	Ag-O-Cs
5653	1	S-4	2.6	250	25	5	75	250	20	45	100	0.25	0080	Cs-Sb
6570	8	S-1	3.0	500	25	5	100	250	20	35	50	0.013	0080	Ag-O-Cs
C34001	6	—	2.0	250	3.0	0.5	85	90	70	90	—	0.0001	0080	Ga-As-P

Side-On Cartridge Types

922	10	S-1	1.0	500	30	5	100	250	12	20	50	0.005	0080	Ag-O-Cs
926	10	S-3	1.0	500	30	5	100	250	4	6.5	15	0.005	0080	Ag-O-Rb

Side-On Composite Anode Types

5652	2	S-4	1.0	250	30 ^d	4 (each unit)	75	250	19	45	100	0.01	0080	Cs-Sb
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Head-On Types

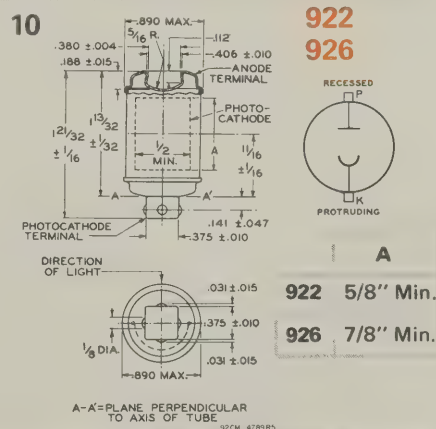
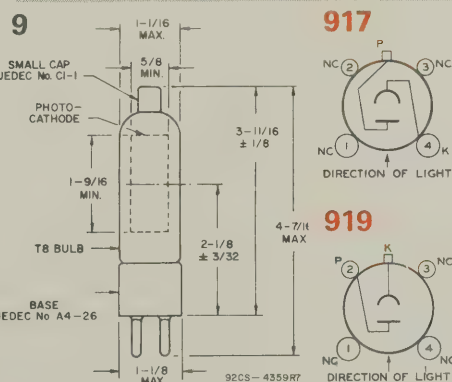
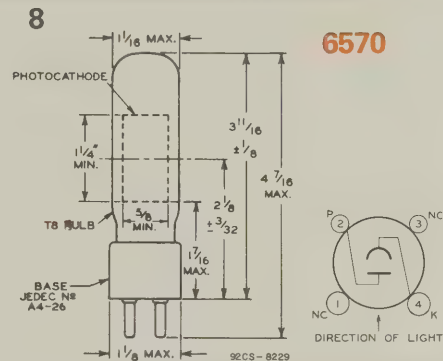
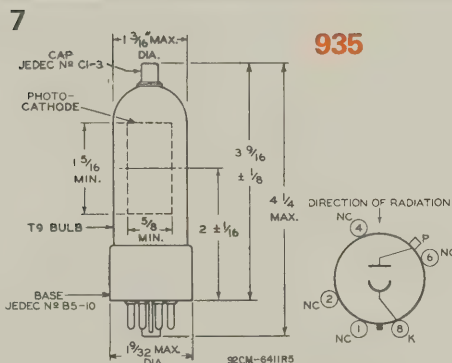
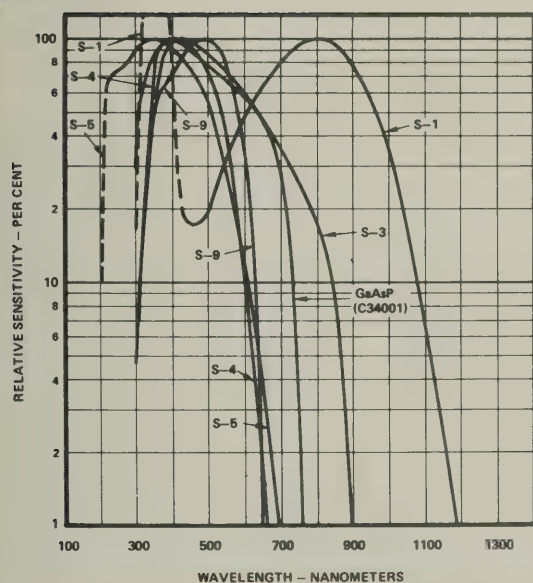
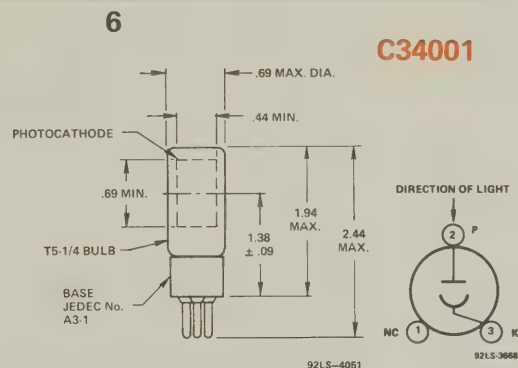
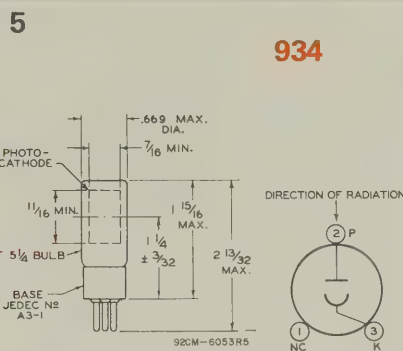
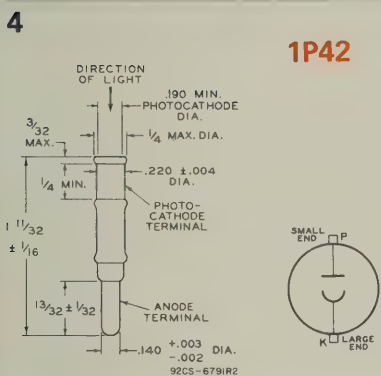
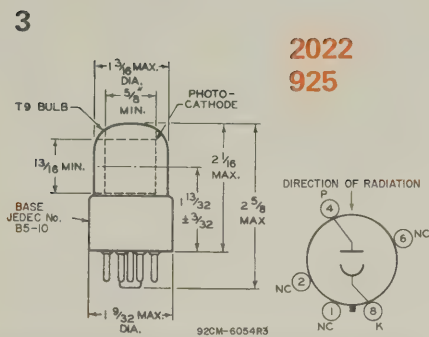
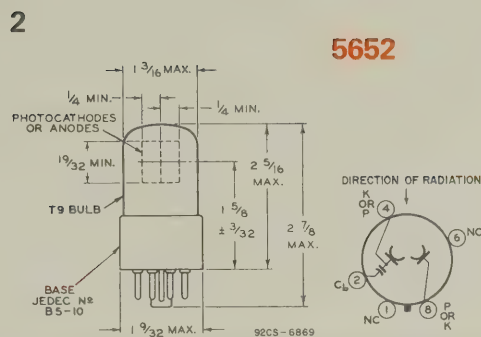
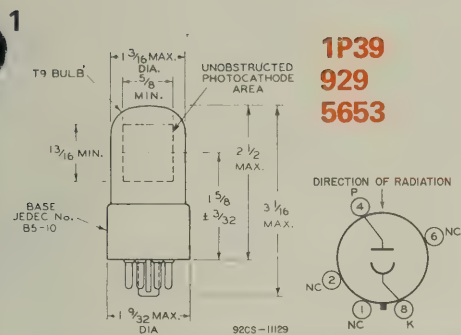
1P42	4	S-9	0.9	180	25	0.4	75	180	20	37	70	0.005	7052	Cs-Sb
------	---	-----	-----	-----	----	-----	----	-----	----	----	----	-------	------	-------

^a Averaged over any interval of 30 seconds maximum.

^b Window Material: 0080 Corning Lime Glass; R6, Kimble Standard Flint; 9741, Corning Ultraviolet Transmitting Glass; 7052, Corning Borosilicate Glass, or equivalent materials.

^c The 917 and 919 are alike except that 917 has the anode connected to the top cap, whereas the 919 has the cathode connected to the top cap.

^d For either electrode.



Typical Photocathode Spectral Response Characteristics

Base JEDEC No.	Socket
A3-1	AM - 78S3S
Special (Cartridge) 922, 926	AL - 446PC

Base JEDEC No.	Socket
A4-26	AM - 77MIP4T
	C - 2154
	L - 2093

Base JEDEC No.	Socket
B5-10	AM - 77MIP8T
	C - 9875
	E - 9729-127
	L - 1935

Dimensions in inches

** For key to socket and shield manufacturers and for key to terminal connections, see page 11.

Photomultipliers and Electron Multipliers Replacement Information

Type To Be
Replaced

RCA Replacement
Type†

Type To Be
Replaced

RCA Replacement
Type†

Type To Be
Replaced

RCA Replacement
Type†

Amperex, Philips and Valvo PMT

XP1000	6342A*, 8053 ^{††}
XP1001	6342A*, 8053 ^{††}
XP1002	4463
XP1004	6903
XP1005	C70007A

XP1010	6199 ^{††}
XP1011	4440
XP1015	4461
XP1020	8575
XP1021	8575

XP1023	C31000AH
XP1030	8054 ^{††}
XP1031	8054 ^{††}
XP1040	4522
XP1110	7767 ^{††}

XP1111	7767 ^{††}
XP1113	7764
XP1115	4460
XP1116	C70102B
XP1117	8644

XP1121	C70131
XP1123	C70131
XP1131	C70131
XP1210	C70045D
50AVP	6199 ^{††}

52AVP	7767
53AVP	6342A ^{††}
54AVP	8055 ^{††}
56AVP	8575
56AVP/03	8575

56CVP	C70007A
56DVP	8575
56TVP	C31000A
58AVP	4522
150AVP	6199 ^{††}
150CVP	7102

Hamamatsu

1P21	1P21*
1P28	1P28*
931A	931A*
6199	6199*

Hamamatsu (cont'd)

7102	7102*
7696	6342A ^{††}
PM49	7200
R106	7200
R136	C7151U

R197	C7075D
R208	6903
R209	6217
R212	1P28
R256	8571

ITT

FW130	PF1011, C31034
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Dumont

6292	8053
6363	8054
6364	8055
6365	7764*
7064	8053

7065	6199
K1295	8053
K1303	4460
K1305	6217
K1306	6903

K1322	4438, 6199,
K1361	6199, 4441
K1390	8054
K1391	8055
K1404	8644

K1427	6903
K1428	7746, 8053
K1430	8054
K1447	4463, 7326
K1485	4464

K1500	8053, 7746, 6342A
K1519	6217
K1716	8645
K1717	8645

EMI

6255B	8575
6255S	8575
9514B	8575
9514S	8575
9558B	7265, C31000B

9594B	6810A*
9600	2067
9609B	8571
9634B	8575
9634QB	8575

9635B	8575
9637B	7764
9637KB	7764
9638B	2067
9656KB	8053*

9656KS	4523*
9656QKB	6903
9660B	1P28
9661B	1P28*, 1P28A*,
	1P28/VI*, 1P28A/VI*
9662B	7200

9665B	7200
9684B	7102
9698B	8644
9698QB	C70042D
9708B	8054

9708KB	8054
9708KR	4525
9708R	4525
9708S	4524
9709B	8055

9709KB	8055
9709R	4525
9701B	C70007A
9710KB	C70007A
9710TB	4464

9726B	2067
9726KB	2067

† The replacement type may require circuit modifications to handle different maximum ratings and/or typical operating characteristics.

* All RCA types designated with the key (*) are direct replacements.

†† For improved cathode quantum efficiency and lower dark current, the following RCA alkali cathode tubes should be considered:

For 7767	consider 4516	For 8053	consider 4523
For 6199	consider 4517	For 8054	consider 4524
For 6342A	consider 4518	For 8055	consider 4525

Index by Types

Type No.	Product*	Page	Type No.	Product*	Page	Type No.	Product*	Page
1P21	PMT	26	4802	PMT	36	C31009	PMT	66
1P22	PMT	28	5581	PD	76	C31009A	PMT	66
1P28	PMT	28	5582	PD	76	C31009B	PMT	66
1P28A	PMT	28	5583	PD	76	C31009C	PMT	66
1P28/V1	PMT	28	5652	PD	78	C31012	PMT	66
1P28A/V1	PMT	28	5653	PD	78	C31012A	PMT	66
1P29	PD	76	5819	PMT	52	C31012B	PMT	66
1P37	PD	76	6199	PMT	42	C31012C	PMT	66
1P39	PD	78	6217	PMT	52	C31016F	PMT	40
1P40	PD	76	6328	PMT	26	C31016G	PMT	40
1P41	PD	76	6342A	PMT	50	C31017	EM	72
1P42	PD	78	6405/1640	PD	76	C31017A	EM	72
868	PD	76	6570	PD	78	C31017B	EM	72
917	PD	78	6655A	PMT	52	C31017C	EM	72
918	PD	76	6810A	PMT	54	C31019	EM	72
919	PD	78	6903	PMT	52	C31019A	EM	72
920	PD	76	6953	PD	76	C31019B	EM	73
921	PD	76	7102	PMT	42	C31019C	EM	73
922	PD	78	7117	PMT	26	C31021	EM	73
923	PD	76	7200	PMT	28	C31021A	EM	73
925	PD	78	7265	PMT	54	C31022	PMT	28
926	PD	78	7326	PMT	54	C31024	PMT	58
927	PD	76	7746	PMT	54	C31025B	PMT	30
929	PD	78	7764	PMT	36	C31025C	PMT	30
930	PD	76	7767	PMT	36	C31025J	PMT	30
931A	PMT	26	7850	PMT	54	C31025K	PMT	30
934	PD	78	8053	PMT	62	C31025M	PMT	30
935	PD	78	8054	PMT	64	C31025N	PMT	30
2020	PMT	52	8055	PMT	68	C31026	PMT	40
2022	PD	78	8571	PMT	24	C31027	PMT	70
2060	PMT	42	8575	PMT	60	C31029	PMT	70
2061	PMT	50	8644	PMT	34	C31034	PMT	56
2063	PMT	62	8645	PMT	34	C31034A	PMT	56
2064B	PMT	64	8664	PMT	62	C31034B	PMT	56
2065	PMT	68	8664/V1	PMT	62	C31034C	PMT	56
2067	PMT	44	8850	PMT	58	C31034D	PMT	56
4409	PD	76	8851	PMT	58	C34001	PD	78
4438	PMT	44	8852	PMT	58	C70007A	PMT	54
4439	PMT	44	8853	PMT	58	C70042D	PMT	34
4440	PMT	44	8854	PMT	68	C70042K	PMT	34
4441	PMT	46	C7075D	EM	72	C70042R	PMT	34
4441A	PMT	46	C7075J	PMT	26	C70042S	PMT	38
4460	PMT	38	C7151N	PMT	48	C70045C	PMT	32
4461	PMT	46	C7151Q	PMT	48	C70045D	PMT	32
4463	PMT	62	C7151U	PMT	44	C70102B	PMT	38
4464	PMT	64	C7151W	PMT	42	C70102E	PMT	38
4465	PMT	68	C7151Y	PMT	44	C70102F	EM	73
4471	PMT	26	C7151Z	PMT	44	C70102H	EM	73
4472	PMT	26	C7151AA	PMT	42	C70102K	EM	73
4473	PMT	26	C7164R	PMT	50	C70102M	PMT	38
4507	PMT	60	C7164S	PMT	50	C70102N	PMT	38
4516	PMT	36	C7187J	EM	72	C70114C	PMT	46
4517	PMT	42	C7187K	EM	72	C70114F	PMT	46
4518	PMT	50	C31000A	PMT	60	C70114J	PMT	46
4521	PMT	64	C31000B	PMT	60	C70120E	EM	73
4522	PMT	68	C31000M	PMT	58	C70128	PMT	36
4523	PMT	62	C31000N	PMT	58	C70129D	EM	73
4524	PMT	64	C31000Z	PMT	60	C70129G	PMT	24
4525	PMT	68	C31000AH	PMT	60	C70129H	PMT	24
4526	PMT	32	C31000AJ	PMT	60	C70131	EM	73
4552	PMT	28	C31004A	PMT	26	C70132A	PMT	48
4555	PMT	28	C31005	PMT	36	C70132B	PMT	48

HOW TO USE THE SPECTRAL RESPONSE BAR GRAPHS AND SPECTRAL RESPONSE CURVES

The numbers in each bar are typical photocathode sensitivity values in milliamperes per watt, at the specified wavelengths, of an arbitrarily selected RCA photomultiplier having a given spectral response. The peak value is shown in the red area of the bar. To obtain typical radiant sensitivities, at any wavelength, of other photomultipliers having the same response but different peak values, take the ratio of the tube's specified cathode radiant sensitivity at the wavelength of maximum response to the number shown in the red area, and multiply by the numbers shown in the bar. For example, type 7767 has spectral response 107 (S-11). It has a typical peak cathode sensitivity at 440 nm of 48 mA/W. The typical peak sensitivity value shown in the 107 (S-11) bar is 56 mA/W at 440 nm. Accordingly, the sensitivity to be expected from the 7767 at 500 nm and at 600 nm would be:

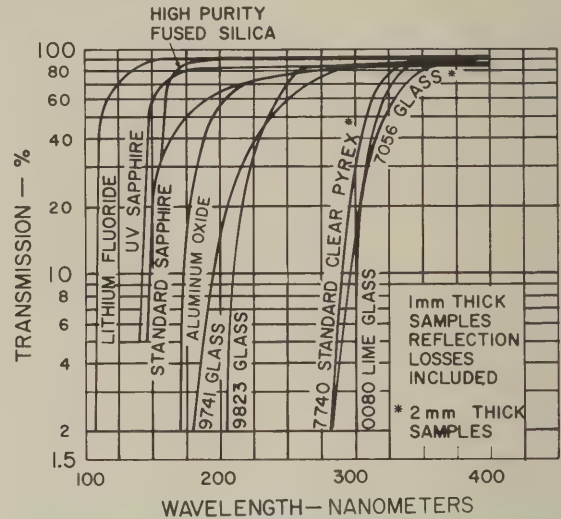
$48/56 \times 47 \approx 41 \text{ mA/W at 500 nm}$
and $48/56 \times 11 \approx 9.4 \text{ mA/W at 600 nm}$

To obtain typical cathode quantum efficiency of the 7767 at 500 and 600 nm, multiply the values obtained above by the factors shown in the second column of chart at 500 and 600 nm, i.e.,

$41 \times 0.248 \approx 10\% \text{ QE at 500 nm}$
and $9.4 \times 0.207 \approx 1.9\% \text{ QE at 600 nm}$

The spectral response ranges of the different bars have been terminated at the short wavelength near the cutoff limits established by the transmission characteristics of the window materials, and at the long wavelengths arbitrarily near the 1% point of the maximum value shown in red.

Tick marks at each bar value allow the use of a straight edge to quickly select the spectral response or responses providing highest sensitivity at any selected wavelength. Typical emitters of radiant energy are shown for reference purposes.



Typical Transmission Characteristics of Window Materials

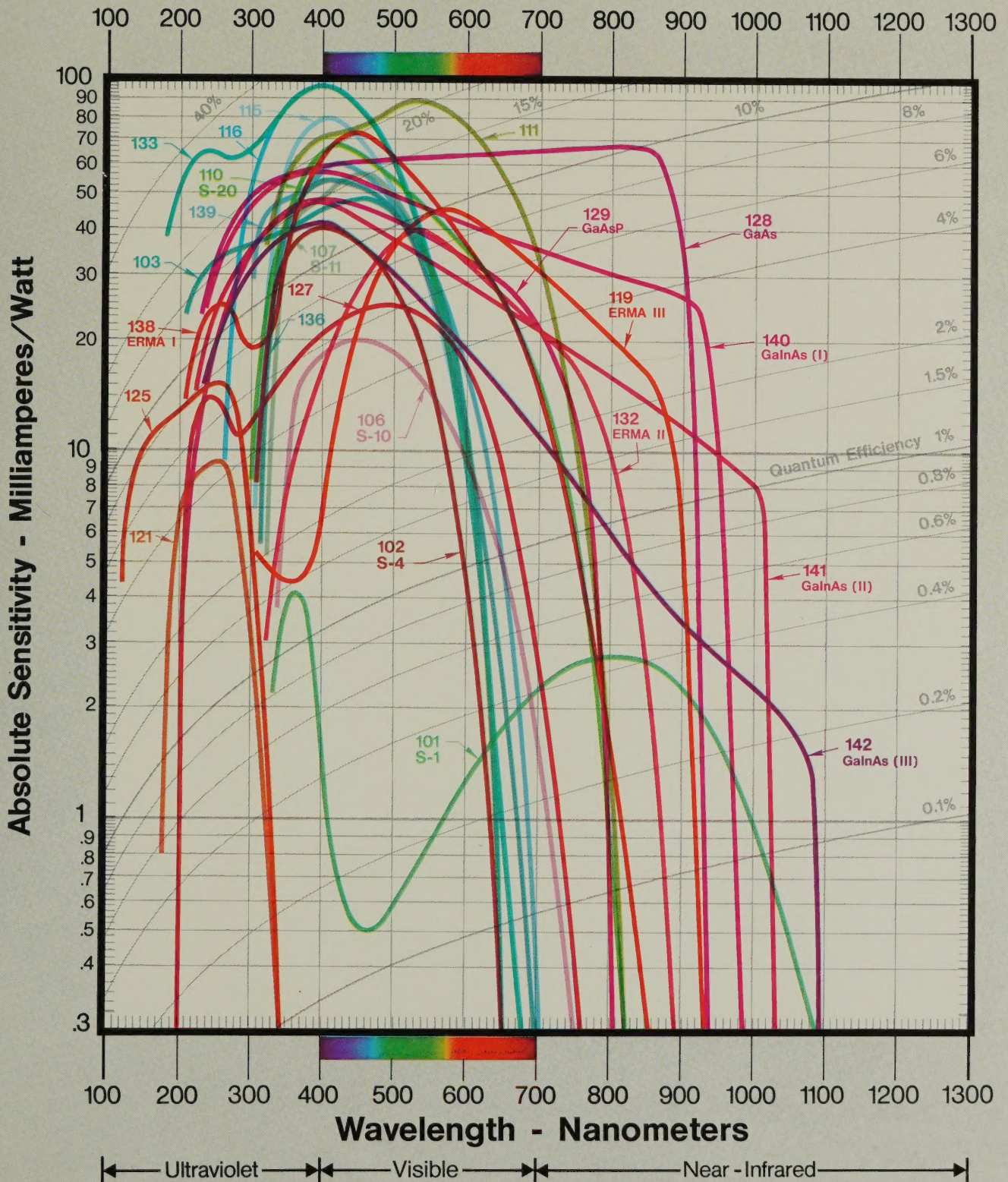
RCA Electronic Components

Sales Offices

(Contact the office nearest you)

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California	Los Angeles	6363 Sunset Blvd., Hollywood, CA 90028	(213) 461-9171	Texas	Dallas	RCA Center, 8700 Stemmons Freeway, Dallas, TX 75247	(214) 638-6200
	San Francisco	(D) 420 Taylor Street, Suite 401-408, San Francisco, CA 94102	(415) 441-2200		Houston	(D) 2727 Allen Parkway, Suite 2121, American General Bldg., Houston, TX 77019	(713) 529-7601
		(E) 4546 El Camino Real, Los Altos, CA 94022	(415) 948-8996	Virginia	Metro. Washington, D.C. and Baltimore	1901 N. Moore St., Arlington, VA 22209	(D) (703) 558-4262 (E) (703) 558-4161
Colorado	Denver	(D) 2785 N. Speer Blvd., Room 346, Denver, CO 80211	(303) 433-8841	Washington	Seattle	(D) 2246 First Avenue S., Seattle, WA 98134	(206) 622-8350
Florida	Palm Beach	2828 Broadway, Riviera Beach, FL 33404	(D) (305) 842-2171 (E) (305) 842-1577				
Georgia	Atlanta	(D) RCA Bldg., 14 Executive Park Drive, N.E., Atlanta, GA 30329	(404) 634-6131				
Illinois	Chicago	446 E. Howard Ave., Des Plaines, IL 60018	(312) 827-0033				
Indiana	Fort Wayne	Maplewood Plaza, Suite 207, 6012 Stelhorn Rd., Ft. Wayne, IN 46805	(219) 485-9683				
	Indianapolis	2511 E. 46th St., Suite Q1, Atkinson Sq., Indianapolis, IN 46205	(D) (317) 545-7697 (E) (317) 546-4001				
Massachusetts	Boston	(D) 360 First Ave., Singer Bldg., Needham Heights, MA 02194	(617) 444-8490				
		(E) 150 A Street, Needham Heights, MA 02194	(617) 444-7200				
Michigan	Detroit	(D) 28840 Southfield Rd., Lathrup Village, MI 48076	(313) 557-7555				
Minnesota	Minneapolis	(D) 6750 France Ave. S., Suite 122, Minneapolis, MN 55435	(612) 929-0676				
Kansas	Kansas City	5750 W. 95th St., Suite 111, Overland Park, KS 66207	(D) (913) 642-2852 (E) (913) 642-7656				
New Jersey	Metro. Phila.	(E) 1998 Springdale Rd., Cherry Hill, NJ 08034	(609) 424-4773				
	North Jersey	Central and Terminal Avenues, Clark, NJ 07066	(201) 485-3900				
New York	Metro. NYC	Central and Terminal Avenues, Clark, NJ 07066	(201) 485-3900				
	Syracuse	731 James St., Room 206, Syracuse, NY 13203	(D) (315) 474-6234 (E) (315) 474-8221				
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				INTERNATIONAL			
				EUROPE, MIDDLE EAST AND AFRICA			
				Switzerland	Geneva	RCA International Marketing, SA 2-4, rue du Lievre, Geneva, 1227 Switzerland	43 58 00
				FAR EAST	Hong Kong	RCA International Limited, 1927 Prince's Bldg., Chater Rd., Hong Kong	23 41 81
				CENTRAL AMERICA			
				Mexico	Mexico City	RCA S.A. de C.V., Apartado 6-905, Mexico D.F.	533-6040
				NORTH AMERICA			
				U.S.A.	New York	International Marketing, P.O. Box 270, Harrison, NJ 07029	(201) 485-3900
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				UNITED KINGDOM			
				England	Sunbury	RCA Limited, Lincoln Way, Windmill Rd., Sunbury-on-Thames, Middlesex, England	85511
				(D) Distributor (E) Equipment			

Typical Photocathode Spectral Response Characteristics



HOW TO USE THE SPECTRAL RESPONSE BAR GRAPHS AND SPECTRAL RESPONSE CURVES

The numbers in each bar are typical photocathode sensitivity values in milliamperes per watt, at the specified wavelengths, of an arbitrarily selected RCA photomultiplier having a given spectral response. The peak value is shown in the red area of the bar. To obtain typical radiant sensitivities, at any wavelength, of other photomultipliers having the same response but different peak values, take the ratio of the tube's specified cathode radiant sensitivity at the wavelength of maximum response to the number shown in the red area, and multiply by the numbers shown in the bar. For example, type 7767 has spectral response 107 (S-11). It has a typical peak cathode sensitivity at 440 nm of 48 mA/W. The typical peak sensitivity value shown in the 107 (S-11) bar is 56 mA/W at 440 nm. Accordingly, the sensitivity to be expected from the 7767 at 500 nm and at 600 nm would be:

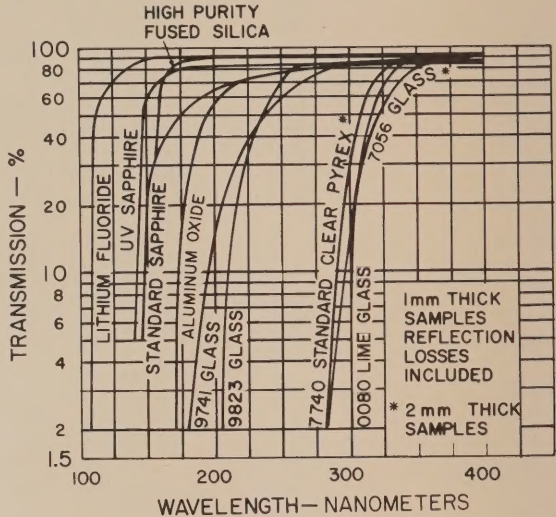
48/56 x 47 ≈ 41 mA/W at 500 nm
and 48/56 x 11 ≈ 9.4 mA/W at 600 nm

To obtain typical cathode quantum efficiency of the 7767 at 500 and 600 nm, multiply the values obtained above by the factors shown in the second column of chart at 500 and 600 nm, i.e.,

41 x 0.248 ≈ 10% QE at 500 nm
and 9.4 x 0.207 ≈ 1.9% QE at 600 nm

The spectral response ranges of the different bars have been terminated at the short wavelength near the cutoff limits established by the transmission characteristics of the window materials, and at the long wavelengths arbitrarily near the 1% point of the maximum value shown in red.

Tick marks at each bar value allow the use of a straight edge to quickly select the spectral response or responses providing highest sensitivity at any selected wavelength. Typical emitters of radiant energy are shown for reference purposes.



Typical Transmission Characteristics of Window Materials

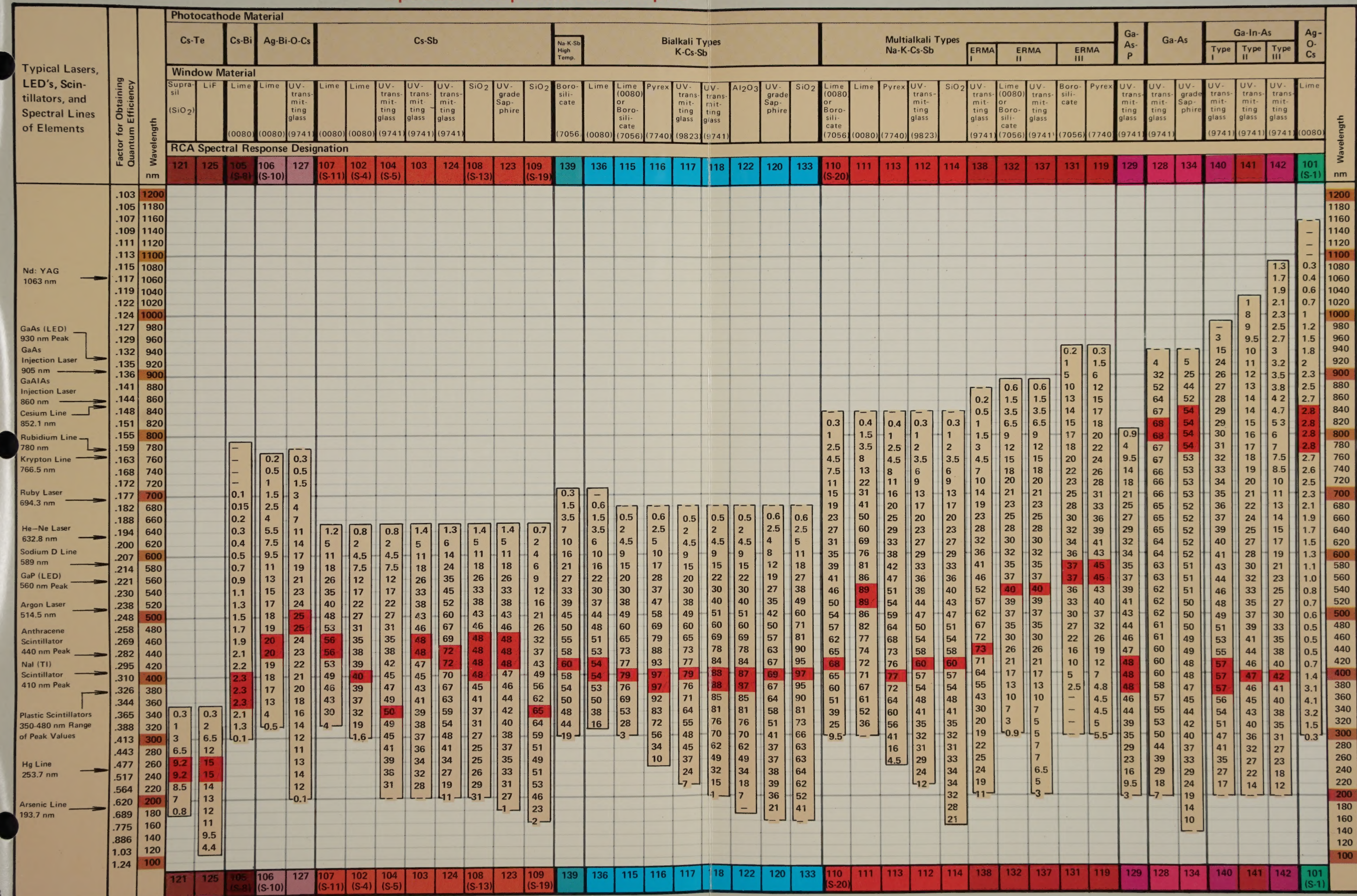
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	San Francisco.....	(D) 420 Taylor Street, Suite 401-408, San Francisco, CA 94102.....	(415) 441-2200	
		(E) 4546 El Camino Real, Los Altos, CA 94022.....	(415) 948-8996	
Colorado.....	Denver.....	(D) 2785 N. Speer Blvd., Room 346, Denver, CO 80211.....	(303) 433-8841	
Florida.....	Palm Beach.....	2828 Broadway, Riviera Beach, FL 33404.....	(D) (305) 842-2171 (E) (305) 842-1577	
Georgia.....	Atlanta.....	(D) RCA Bldg., 14 Executive Park Drive, N.E., Atlanta, GA 30329.....	(404) 634-6131	
Illinois.....	Chicago.....	446 E. Howard Ave., Des Plaines, IL 60018.....	(312) 827-0033	
Indiana.....	Fort Wayne.....	Maplewood Plaza, Suite 207, 6012 Stelthorn Rd., Ft. Wayne, IN 46805.....	(219) 485-9683	
	Indianapolis.....	2511 E. 46th St., Suite Q1, Atkinson Sq., Indianapolis, IN 46205.....	(D) (317) 545-7697 (E) (317) 546-4001	
Massachusetts.....	Boston.....	(D) 360 First Ave., Singer Bldg., Needham Heights, MA 02194.....	(617) 444-8490	
		(E) 150 A Street, Needham Heights, MA 02194.....	(617) 444-7200	
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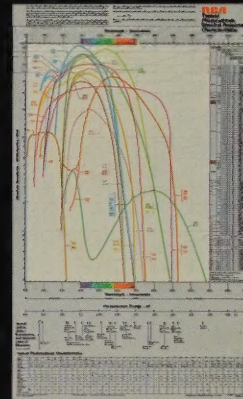
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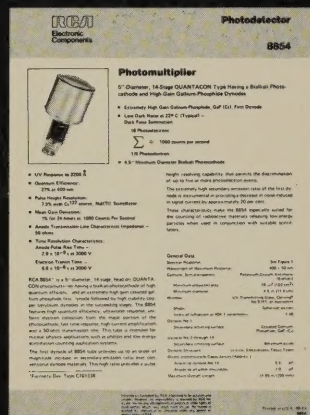
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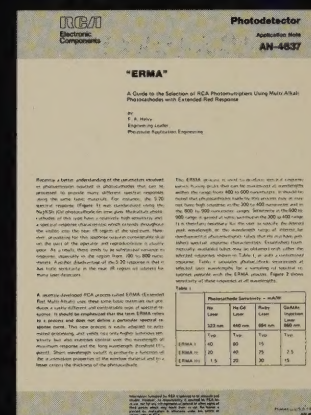
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Spectral Response
Wall Chart
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Commercial and
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Data Sheets



Application
Notes

Selected data are given in this catalog for preliminary tube selection. Complete data are given in Commercial and Developmental data sheets. Single copies are free on request. Other publications, such as those illustrated, are also available on request.

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